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THE
MILITARY
~~SURGEON~~ MEDICINE

JOURNAL OF
THE ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES

EDITED BY
JAMES ROBB CHURCH

VOLUME XLVII

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WASHINGTON, D. C.
THE ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES
1920

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THE
MILITARY SURGEON
Vol. XLVII JULY, 1920 Number 1

MODERN MILITARY MEDICAL AND SURGICAL RECONSTRUCTION AND THE MEASURES OF COOPERATION PRACTICED BY THE MEDICAL DEPARTMENT OF THE ARMY AND FEDERAL BOARD FOR VOCATIONAL EDUCATION [1]

By Colonel FRANK BILLINGS
Medical Reserve Corps, United States Army

THE writer has published articles[2] upon physical reconstruction in military hospitals in which the methods of organization in the S. G. O. and in the hospitals to carry on the work was discussed; statistics were given showing the character of the personnel engaged in occupational and in physiotherapy; the character of occupations utilized in curative work; character of physiotherapy utilized; number of patients in hospitals and percentage of disabled men for whom reconstruction measures were applied month by month; character of sports and pastimes practiced; methods of publicity used to inform the public of the unusual benefits provided by the Government for disabled men of the Army and Navy before and after their discharge and other phases of the subject to which the interested reader is referred. In this article the writer desires to show the early official history of the establishment of measures included under physical reconstruction in military hospitals with copies of official documents of the War Department, which will establish these statements as historical events.

Furthermore, it is shown herewith that the Medical Department of the Army attempted to coöperate with all departments of the Government in the care, training and reëducation of the disabled men before and after their discharge from the Army and Navy.

In August, 1917, the Surgeon General organized the Division of Physical Reconstruction in his office.

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[1] Read at Annual Meeting, New Orleans, La., April 22–24, 1920.

[2] Billings, Frank, Col., M. C., N. A. "Rehabilitation of the Disabled": *J. A. M. A.*, 1919, lxxii, 1505; "The Policy and Program of the Physical Reconstruction of Disabled Soldiers of the U. S. Army": *N. Y. State Jour. of Med.*, 1919, August; "Physical Reconstruction Applied in the Treatment of Pulmonary Tuberculosis": *J. A. M. A.*, 1919, lxxiii, 1033; "The Physical and Mental Rehabilitation of Disabled Soldiers of the United States Army": Trans. of the Cong. of Am. Phys. and Surg., 1919, xl, 105

Physical reconstruction as applied in military hospitals was defined as continued treatment, carried to the fullest degree of maximum physical and functional restoration consistent with the nature of the disability by all known measures of modern medical and surgical management, including physiotherapy (thermo-, electro-, hydro-, and mechanotherapy, massage, calisthenics, gymnastics, military drill, and the like), curative mental and manual work (in wards, shops, schools, gardens and fields), and sports and games in and out of doors.

The adequate application of physiotherapy and of occupational curative measures was new to military medical practice. Unfortunately the program of the Division of Physical Reconstruction was at first too elaborate and embraced plans for the vocational training of the disabled man and his placement in a suitable occupation after his discharge from the Army. This extensive program did not receive the approval of the War Department or of the Government. The Bureau of War Risk Insurance had been given authority by the Government over the compensable disabled discharged soldier, and the Department of Labor had jurisdiction in his occupational placement in civil life. The controversy concerning the treatment and vocational training of the soldier before and after his discharge and his occupational placement was brought to an end by an order issued to the Surgeon General by the Secretary of War on May 6, 1918:

> You are authorized to proceed with the scheme for reconstruction of officers and enlisted men of the Army alone without consideration of the other bureaus of the Government involved. This reconstruction to be clearly understood to end at the point where the medical reconstruction ceases, that is, the reconstruction to take place in such cases of officers and enlisted men as come under proper medical treatment by the War Department, leaving for other reconstruction purposes the subsequent treatment after discharge from the care of the Medical Department.

Disregardful of this understanding of the field of work in reconstruction assigned to the Medical Department of the Army, memoranda prepared for the War Department requesting approval of needed hospital construction, equipment for physiotherapy, for occupational therapy and for a qualified personnel to administer physiotherapy and curative work in military hospitals were disapproved wholly or in part or were returned for additional information by the General Staff.

In spite of the delay incident to this confusion, very creditable application of all the measures included under physical reconstruction was begun early in 1918 at G. H. No. 2, Fort McHenry, at Walter Reed Hospital, and at G. H. No. 6, Fort McPherson.

The Secretary of the Navy requested the War Department to admit disabled sailors and marines to military hospitals for physical reconstruction. This was granted on May 27, 1918.

On June 27, 1918, the President signed the Vocational Rehabilitation Act. This law provided for the vocational education of compensable disabled soldiers, sailors and marines after their discharge from the Army and Navy under the jurisdiction of the Federal Board for Vocational Education. The jurisdiction of the War and Navy Departments over disabled men of the military and naval forces was expressed in Section 6 of the Vocational Rehabilitation Act:

> That all medical and surgical work or other treatment necessary to give functional and mental restoration to disabled persons prior to their discharge from the military or naval forces of the United States shall be under the control of the War Department and the Navy Department respectively. Whenever training is employed as a therapeutic measure by the War Department or the Navy Department, a plan may be established between those agencies and the board acting in an advisory capacity to insure, in so far as medical requirements permit, a proper process of training and the proper preparation of instructors for such training. A plan may also be established between the War and Navy Departments and the board, whereby these departments shall act in an advisory capacity with the board in the care of the health of the soldier and sailor after his discharge.
>
> The board shall, in establishing its plans and rules and regulations for vocational training, coöperate with the War Department and the Navy Department, in so far as may be necessary to effect a continuous process of vocational training.

On July 11, 1918, the War Department issued Bulletin No. 36, which contained the full text of the Vocational Rehabilitation Act, and also promulgated the following policy:

> 2. (*a*) Physical reconstruction is defined as complete medical and surgical treatment, carried to the point where maximum functional restoration, mental and physical, has been secured. In securing this result the use of work, mental and manual, will often be required during the convalescent period.
>
> (*b*) Hereafter no member of the military service disabled in line of duty, even though not expected to return to duty, will be discharged from service until he has attained complete recovery, or as complete recovery as it is expected that he will attain when the nature of his disability is considered. When the degree of recovery described in this paragraph has been attained, members of the military service who remain unfit for further duty should be discharged in the manner provided in the Army Regulations.
>
> (201.6 A.G.O.)
>
> By order of the Secretary of War:
>
> Peyton C. March,
> *General, Chief of Staff.*
>
> *Official:*
> H. P. McCain,
> *The Adjutant General.*

On July 31, 1918, in conformation with the Vocational Rehabilitation Act, the Surgeon General, with the approval of the General Staff, announced the completion of plans for physical reconstruction of disabled soldiers in the general military hospitals. These plans are formulated with a view to close coöperation with the War Department Committee on Education and Special Service in the work of restoring men to full or limited military service, and with the Federal Board of Vocational Education which is authorized by law to provide vocational training for disabled men after their discharge from the Army and Navy.

To illustrate the proposed work, the records of 516 cases treated in four hospitals show 134 men able to return to full military duty, 210 fit for limited service, and 172 who are eligible for discharge. In the last group 12 are classed as helpless or institutional cases, 121 are able to return to their former occupations, and 39 will need further training to fit them for earning a livelihood. These figures show the division of responsibility in the work of reconstruction. The task for fitting men for further military service is at present the most pressing need because, wherever an able-bodied man behind the lines can be replaced by one less fit physically, but vocationally capable, a soldier is gained for active duty. The reconstruction work in the hospitals, therefore, will emphasize technical training in all lines capable of adaptation to the physical limitations of disabled men and in which employment will act as a therapeutic agent. When play and work and study will help a man to get well, this kind of medicine will be prescribed to the patient. If the work he does leads to further service in the Army or to better prospects in civilian life, so much the better.

The Surgeon General has designated the following general military hospitals for the work of physical reconstruction: Walter Reed General Hospital, Washington; General Hospital No. 2, Fort McHenry, Baltimore, Md.; General Hospital No. 3, Colonia, N. J.; General Hospital No. 6, Fort McPherson, Ga.; General Hospital No. 7, Roland Park, Baltimore (for the blind); General Hospital No. 8, Otisville, N. Y.; General Hospital No. 4, Fort Porter, N. Y.; General Hospital No. 11, Cape May, N. J.; General Hospital No. 9, Lakewood, N. J.; General Hospital No. 16, New Haven, Conn.; General Hospital No. 17, Markleton, Pa.; Letterman General Hospital, San Francisco, Cal.; U. S. Army Hospital, Fort Des Moines, Iowa; Plattsburg Barracks Hospital, Plattsburg Barracks, N. Y.; General Hospital, Fort Bayard, New Mexico.

To secure functional, physical and mental restoration, all methods recognized by modern medicine as conducive to cure will be utilized. In other words, not only the ordinary means of medicine and surgery, including all specialties, will be utilized, but also physical measures such as are employed under physiotherapy, including hydro-, electro-, and mechanotherapy, active exercises, indoor and outdoor games and passive exercise in the form of massage. Provision in the form of adequate buildings and equipment for physiotherapy have been adopted in each of the hospitals.

Modern medicinal treatment does not end with physical cure. Functional restoration is the final aim of the modern physicians and surgeons. It is conceded that the physical rehabilitation of disabled men is peculiarly dependent upon their mental attitude. The more serious the disability, the greater the danger of mental depression and indisposition to respond to medical and surgical treatment. The educational work should begin, therefore, at the moment when the man has arrived at the stage where he begins to worry about his future, whether in this country or overseas. The first problem is to divert his attention, by simple recreation through reading, pictures, games, handiwork occupations and the like, with a view to securing a genuine interest in the attainment of some worthy end. The end most certain to hold his attention and to claim his best efforts is his future vocation. Hence by gradual steps he should be induced to supplement his previous vocational experience by academic, scientific or technical instruction, or to choose a new vocation and begin preparation for it if such a course is necessary.

The need of "Cheer-up" work in the hospitals extends to all who are mentally capable of planning for their own future. This means a relatively large proportion of the entire number. The beginning is made at the bedside with handicrafts of various kinds grouped under the term "occupational therapy." When the man is able to leave the ward and can be benefited physically by technical training, he has the opportunity of working at specific trades either in the curative workshop, in specially provided classrooms, or out of doors.

The teachers for this work have been secured from the convalescent disabled soldiers who are already skilled in their vocations, and from the enlisted personnel of the Army secured by transfer or by induction of registrants disqualified for general military service, but qualified for special limited service. These instructors work under the direction of educational officers chosen for their professional standing in civil life, and commissioned in the Sanitary Corps of the Medical Department. The General Staff has just authorized commissions for 119 educational officers for this purpose.

From the military standpoint soldiers may be placed in three general classes:

1. Those who can be restored to full duty.
2. Those who can be fitted for limited service.
3. Those disabled to the extent of unfitting them for further military service.

It is the announced policy of the Surgeon General that patients of the first class should have, when circumstances warrant it, the benefit of therapeutic treatment, through play, work and study, as may be prescribed by medical officers, in order that their morale may be stiffened, their special skills improved, their future usefulness increased, and their recovery hastened.

Patients of the second class should have, whenever conditions permit and the medical officers approve, such specific training—physical and vocational—as will in the judgment of the educational officers best fit such patients for limited service of a particular kind. At present, patients are being trained in general hospitals for limited service as general and vocational teachers, typists, printers, tailors, cobblers, harness-makers, welders, motor mechanicians, painters, machine workers, wood workers, bookkeepers, statisticians, telegraphers, photographers, telephone operators, cooks, storekeepers, electricians, etc.

The list will be extended with the advice and coöperation of the Committee on Education and Special Service of the War Department to meet other needs as they arise. In connection with the large general hospitals there is abundant opportunity for practice in many trades and occupations. At Fort McPherson, for example, practical experience can be gained in twenty different trades. Moreover, there is immediately adjacent to the hospital a large quartermaster's mechanical repair shop covering all phases of mechanical repair and construction to which men can be assigned for limited service or to gain experience.

Patients of the third class (*c*) should be encouraged in every possible way to accept the benefits accorded to them for vocational training by the Federal Board for Vocational Education. To this end they should have, while in the hospital, such physical training and general education as will best promote their physical reconstruction and at the same time contribute most to their vocational training. Patients who do not elect or who are not eligible to continue their education under the Federal Board should receive such training as the medical and educational officers deem best in each individual case.

On August 26, 1918, the Secretary of War wrote to the Secretary of Commerce, in reply to a letter concerning the vocational training of disabled soldiers by the Federal Board for Vocational Education, as follows:

> Physical reconstruction, as defined by the Surgeon General, is complete medical and surgical treatment carried to the point of maximum functional restoration, both mental and physical.
>
> Whenever play, work or study can be used advantageously as a therapeutic agent, they will be so employed in the general military hospitals. In the work of fitting men for limited military service, strictly vocational training will be given

whenever, in the judgment of the medical officers of a hospital, such training will be either beneficial or not detrimental to the patient. When such a patient is ready for discharge from the hospital and his special training for limited service is not yet complete, he will be turned over to the War Department Committee on Education and Special Training for further development. In the case of patients who will ultimately be discharged from military service, arrangements have already been made in Walter Reed General Hospital whereby the Federal Board for Vocational Training may have access to these men as soon as it is known that they are to be discharged. The educational officers have been directed to coöperate with the representatives of the Federal Board to the fullest possible extent in order that the men concerned may have all the advantages assured them by the Federal Government.

In regard to Class C, the Secretary of War, in the letter above mentioned, concurs with the request made by the Secretary of Commerce that the function of the Federal Board be defined, in the training of disabled soldiers, in the following phraseology:

> The War Department agrees in principle with the proposal of the Federal Board that the course of training for disabled men who are to be discharged from military service should be continuous throughout the period of convalescence in the hospital, and thereafter under the jurisdiction of the Federal Board. He is ready through the Division of Physical Reconstruction to formulate a plan for close coöperation.

From this time until the date of the signing of the armistice the facilities for the physical reconstruction of disabled men were rapidly developed in all of the designated general military hospitals. Some difficulty was met with in securing commissions in the Sanitary Corps of a sufficient number of qualified educators to administer the occupational therapy in the various hospitals. The lack of a sufficient number of commissioned officers was balanced by the admirable efficient energy of the small personnel in service. Fortunately, early in 1918, physical schools and academic institutions coöperated with the Surgeon General in the training of women to qualify them in physiotherapy and in occupational therapy. Approximately 2,500 of these fine women served as reconstruction aids in occupational therapy and in physiotherapy in the A. E. F. and in the domestic military hospitals.

In the plans for physical reconstruction the Surgeon General made especial provision for the treatment of the tuberculous, the blind, and for the soldiers whose disability involved speech defects or deafness. G. H. No. 7 at Roland Park, Baltimore, was developed to give modern training and reëducation of the blind. G. H. No. 11, at Cape May, became an efficient school for the correction of speech defects and for instruction in lip reading. With experience to aid, appropriate and valuable therapy was adopted in the treatment of tuberculosis at the seven general hospitals utilized for the treatment of tuberculous soldiers.

After the armistice was signed the program of physical reconstruction was much modified by the Surgeon General. In the first place the War Department amended paragraph 2 of Bulletin 36 (see above) as follows:

> Sub-paragraph "*a*" is intended to provide for the complete cure of maximum restoration of men incapacitated because of military service. Sub-paragraph "*b*" is intended to provide for the retention in the service of such disabled men until such time as their maximum restoration has been obtained. There will be many cases that will not be benefited by further sojourn in hospitals, convalescent centers or development battalions. These should be promptly discharged. The surgeon who has the case in hand must be the judge as to whether or not maximum restoration has been secured, or if, after treatment in the hospital in which the patient is located is completed, the case will be further benefited by transfer to another hospital, convalescent center, or development battalion. Cases which, in the opinion of the surgeon, will be further benefited should be promptly transferred. There will, furthermore, be many cases of disabled men who either possess funds or who have relatives or friends in position to afford them specialized care after discharge. In these cases disabled men may be discharged, but not until the responsible commanding officer has fully determined that continued treatment and cure are assured. The provisions of Paragraph 2, Bulletin 36, as interpreted above, will govern until further instructions, both for officers and enlisted or drafted men. In this connection, convalescent centers and development battalions are intended for enlisted or drafted men only.

Class "*a*" and class "*b*" disabled soldiers (see above) were to be disposed of as follows:

> Men who entered the service since April, 1917, who, after hospital treatment, are fit to return for full duty, will be sent for discharge to the demobilization center nearest their place of entrance into service as indicated in Circular 106, War Department, December 3, 1918, amended by Circular 122, War Department, December 7, 1918.
>
> Men without regard to date of entry into the service, who have become disabled while in the service, or who had disabilities prior to their entrance which have been aggravated or made worse by service, said disabilities not being due to their own misconduct, will be transferred to convalescent centers per Circular 90, War Department, November 25, 1918, providing further benefit can be expected by additional treatment, training and hardening processes.

This modified regulation restricted the use of prevocational or vocational training as a therapeutic measure of remediable disabled men to the period of the curative treatment often too short to be of any practical utility. And yet, in May, 1919, it was found that 75,000 disabled men in the military hospitals had been enrolled in some form of educational or training service. They had twenty-five to thirty days of technical training or educational instruction. Many had regained control of partially paralyzed muscles, stiffened joints were limbered up, shaky nerves were steadied and physical tone secured through controlled diverting exercise. To many of these men the application of occupational therapy has brought the perception of power and opportunity under handicaps which aroused hope in place of despair and proved to them that the way to overcome a physical disability was to increase efficiency by technical training and education. After the armistice was signed it became necessary for the Surgeon General to make provision in the additional hospitals at home for the physical reconstruction of the large number of disabled men who were to be returned from the A. E. F. as soon as they were able to be transported to the United States.

With the approval of the War Department, the Surgeon General designated additional general, post and base hospitals to function in physical reconstruction, making a total of forty-eight reconstruction hospitals throughout the country.

Very rapidly the facilities for the work were secured in the form of alteration of buildings, installation of equipment and assignment of a personnel to carry on physio and occupational therapy and for sports and games.

The extent of physical reconstruction of the disabled men will be appreciated upon consideration of the following facts.

On April 30, 1919, the hospital personnel of the Department of Occupational Therapy consisted of:

Commissioned officers	270
Noncommissioned officers	527
Enlisted men	361
Reconstruction aids	1,070
Civilian employes (men)	78
(women)	15
Total	2,321

The personnel of the Department of Physiotherapy was:

Commissioned officers	44
Enlisted men	50
Reconstruction aids	725
Total	819

During April, 1919, 66,640 patients received treatment in the military hospitals which functioned in physical reconstruction. Of these, 38,500 used occupational therapy as a means of diversion or cure. For many the curative work was prevocational or vocational training.

From May 1 to December 31, 1919, the work of physical reconstruction continued with greater and greater enthusiasm and with an increased percentage of the disabled men electing to take curative work often vocational in character. In considering the percentage of those to whom occupational therapy was not applied, one must keep in mind those who were in the hospital a short time (seven days or less), contagious disease patients, acutely ill men, serious psychopathic patients and the men absent on furlough or A. W. O. L.

COÖPERATION WITH THE FEDERAL BOARD FOR VOCATIONAL EDUCATION

Immediately after the President had signed the Vocational Rehabilitation Act, the Surgeon General directed the Division of Physical Reconstruction to hold conferences with the Federal Board for Vocational Education for the consideration of coöperation in the application of prevocational or vocational training as a curative measure. As a result of these conferences, agreement was secured upon many points which it was believed would result in great benefit to the disabled soldier, both before and after his discharge from the Army. Among the articles agreed upon for coöperative aid of the disabled men, a few are worthy of mention.

In July, 1919, the Surgeon General directed the commanding officer of each hospital functioning in physical reconstruction to receive, give office space, and facilitate the work of designated agents of the Federal Board in affording vocational guidance and information as to thier privileges under the Government to convalescent disabled soldiers about to be discharged from the hospital. The Federal Board at times had difficulty in securing vocational guidance agents for all hospitals. Upon the request of the Federal Board, the Surgeon General directed the chief educational officer of the hospital to act temporarily, in so far as his regular duties permitted, as the vocational adviser of the disabled soldier for the Federal Board.

It was found that paragraph 824 A. R. prevented army officers from giving the full information of the disability of a soldier desired by the Federal Board and the Bureau of War Risk Insurance in the fulfillment of their respective duties intended to be of benefit to the soldier. The Surgeon General suggested a change, and in consequence, in December, 1918, the War Department amended paragraph 824 A. R. The last sentence of the order of amendment reads:

> Nothing contained in this paragraph shall be construed as prohibiting the furnishing to the Federal Board for Vocational Education such information concerning a disabled soldier's medical history as may be considered valuable in his vocational training.

A committee composed of officers of the Division of Physical Reconstruction and representatives of the Federal Board compiled approximately fifty pamphlets, designated Joint Series of Educational Guides, upon academic, technical and general subjects, as guides for teachers and disabled men, both before and after discharge from the Army.

Joint circulars were issued containing information for the disabled soldier upon his responsibilities and his privileges as provided by the Government for hospital treatment, for insurance and pension, and for vocational training. So far as possible these circulars were distributed to the disabled men at ports of embarkation and debarkation, in hospitals and in convalescent centers.

Circular letters were sent by the Surgeon General to the commanding officers and to the chief educational officers of all hospitals, directing them to inform all disabled men, personally or by bulletins, of the privileges and benefits provided for them by the Government and to emphasize the great benefits to be derived from vocational training in the hospital and after discharge under the jurisdiction of the Federal Board.

In this connection it should be said that the Federal Board agreed that, if the training or education of the disabled soldier begun in the hospital was not finished at the time of discharge from the Army, the Board would complete the training or education in the same vocation.

When convalescent centers were established in the training camps for the purpose of hardening and final cure of the convalescent disabled men, preliminary to discharge, by training, education, drill exercise and the like, accredited agents of the Federal Board were authorized to interview the soldiers.

In February, 1919, the Federal Board requested the assignment of medical officers of the Army for administrative duty at Washington and in each Federal Board district of the country. Upon the request of the Surgeon General the War Department approved the assignment of one medical officer of the Army to duty in the Washington office of the board. Owing to the need of a large number of medical officers to treat the vast number of sick and wounded soldiers, there were no further available medical officers to assign to duty with the board. In this connection it should be said that the Surgeon General directed the attention of the Federal Board to the fact that, under the law, the disabled compensable discharged soldier was under the jurisdiction of the Bureau of War Risk Insurance, and that further medical and surgical care was to be provided by the Federal Public Health Service.

Disaffection occurred of the blind or nearly blind soldiers under treatment at G. H. No. 7, Roland Park, Baltimore, because they desired payment of the war insurance and total disability pension, which they could not obtain under the law until after discharge from the Army.

Early in 1919 conferences were held between officers of the General Staff, officers of the S. G. O., representatives of the Federal Board, the American Red Cross and the Bureau of War Risk Insurance. As a result it was agreed that this splendid hospital and technical school for the blind soldiers should be transferred to, and for the time needed should be administered by, the American Red Cross. The Federal Board agreed to act in an advisory capacity in the vocational training of the discharged blinded soldiers, sailors and marines. It should be said in this connection that G. H. No. 7 was the only available school in the United States for these blinded men; that but for the foresight of the Medical Department of the Army in organizing the hospital and school, the Federal Board would have been embarrassed to find available schools for the training of discharged men who were blinded in the World War.

The foregoing are examples of the many ways in which the Medical Department of the Army coöperated with the Federal Board in the desire to carry out efficiently the benefits and privileges provided by the Government for disabled men of the Army and Navy. In this connection it only remains to be said that the Surgeon General consistently and persistently directed all officers under his command to coöperate in every rational way with other governmental agencies charged with duties intended to benefit disabled soldiers.

Finally, something must be said of the utility of the application of curative measures included under physical reconstruction in army hospitals. I think it is the consensus of opinion of those who had the opportunity to observe the efficient application of physiotherapy, curative work in wards, shops and fields with the addition of gymnastics and sports and games, that these measures improved discipline and morale, diverted the patient's mind from the contemplation of his disabling handicap, aroused interest in an old or new occupation, stimulated endeavor to acquire mental or manual skill to better qualify himself for an old job or to fit him for a new one, and in many men developed the determination to finish the education or technical training begun in the hospital, after discharge, under the jurisdiction of the Federal Board or at their own expense. Thousands of illiterate disabled soldiers learned to read and write English while in the hospitals. Many of these illiterates, and many more aliens who were literate, were Americanized during their convalescence in the hospitals. Thousands of disabled soldiers received vocational training as curative work in the military hospitals which better qualified them for old jobs or completely qualified them for new and lucrative occupations. Motor mechanics, farm tractor mechanics, vulcanizing, gardening, farming, animal industry, poultry farming, carpentry, wood carving, shoemaking and repairing, telegraphy (Morse and wireless), stenography, typewriting, mechanics of printing, motion picture operating and the like are some of the technical trades in which many disabled soldiers received complete training. It must be said, too, that this training, utilized as curative work, made the functional and physical restoration more certain and shortened the stay in the hospital.

The Medical Department of the Army is to be congratulated upon the fact that the first complete application of physical reconstruction in hospital treatment in this country has been successfully carried out in the army hospitals of this country. This innovation and its great utility in military hospital practice has established a principle which civilian hospitals must accept and follow.

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SPECTACLES FOR SOLDIERS—A COMPARISON OF THE AMERICAN AND GERMAN SYSTEM OF SUPPLY

By RALPH A. FENTON, A.B., M.D.[1]

EXAMINATION and enlistment for military service of a very large percentage of American youth during 1917 and 1918, with very considerable lowering of earlier visual standards of acceptance, created for army surgeons a series of problems almost unknown in the regular army; and the assignment of regular army officers to positions of an executive nature left these clinical problems very largely to reservists just out of civil life and unfamiliar with the difficulties of long distance supply.

Many soldiers and officers who had worn glasses in the past decided that they were unnecessary in a military career; such men left their glasses at home, or forgot their prescriptions, or did not replace breakages, later suffering much annoyance from the brimless overseas cap, from exposure to the white roads of France, from work on necessary records or in technical schools, or other exciting causes of visual strain.

Other soldiers, either specially enlisted or classed and employed as specialists: map artists, photographers, engravers; accountants, filing clerks, typists; microscopists, analysts, technicians; fine machinists, gunsmiths, lathemen; electricians, telegraphers, signalers; observers, sharpshooters, gunpointers; and many other classes, were subjected to unusual eye strains, often under conditions of bad lighting and physical fatigue. Such individuals frequently became partially incapacitated until relieved by eye examination and provision of proper glasses.

Another class, due to inaccurate or hurried work by draft boards, was not infrequently discovered even at the front—men falling far below normal combatant visual standards, who had slipped in by memorizing test cards, or had been passed by some careless physician who disregarded visual defects in favor of an otherwise excellent physique. Some of these men were so blind as to be unable to tell friend from enemy a short distance away.

By the coöperation of American optical firms with the ophthalmic division of the section of surgery of the head, Surgeon General's Office, the "Liberty" 40-mm. circular eye nickel spectacle frame, with flat lenses, became official in our army. An attempt was made to supply all soldiers before they started overseas, which often failed lamentably in the press of important details of training, and of military and clothing equipment. Many men had therefore to lose valuable days in France securing eye examination and glasses that should have been obtained before. Others, less fortunate, as in the rapidly moving combat divisions, could not receive eye examination for months at a time, and were finally looked after when their commands were stabilized in billets in the Army of Occupation. Military commanders and regimental surgeons familiar only with the high visual requirements of the regular service were occasionally prone to discount complaints of visual trouble, and sometimes greatly hindered or delayed the examination and eventual relief of such cases.

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Truly remarkable work, in view of the inadequacy of the equipment for the demands made upon it, was done by the optical section of Medical Department Repair Shop No. 1, at Paris, under the direction of Maj. F. C. Edmonds, S. C. From this Base Optical Unit a number of auxiliary optical units, equipped only to assemble the simpler ready-cut lenses, were sent to function in various base hospitals in France, England and occupied Germany. A relatively meager supply of needed lenses was on hand at most times, and it was difficult, especially after the armistice, to secure more. Cases of refraction multiplied by reason of the larger amount of reading and close work encouraged by the establishment of educational courses. In the Army of Occupation these cases were handled on a duty status, and in general returned to command the same day, without being taken up into hospital. This procedure was prescribed by G. O. 12, Hqr. Third Army, January, 1919, and made it possible to handle 2,372 cases in March, 1919, of which but 250 occupied hospital beds, while 449 were in hospital for other causes. Major Edmonds estimated a total of over 8,800 pairs of lenses as the probable six months' requirement for supplying needed glasses and repairs to the Third Army of over 300,000 men.

In view of the frequent misunderstanding by army officers of the need for eye treatment and glass fitting in a citizen army of large proportions, it may be of interest to consider the plans of the German General Staff, as expressed in official publications examined in the Sanitätsamt VIII., Armeekorps, at Coblenz.

The prevalence of myopia among Germans made strict measures imperative; the following maxims preface the "Book of Rules for Furnishing 'Shooting' Glasses":[2]

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[2] "*Vorschriften für das Beschaffen von Schiessbrillen.*" 2nd Edition, Berlin, Sanitary Department, War Ministry, April, 1918. Pp. 29, with appendices; illustrated.

> Usefulness in war of men with defective visual power depends upon the supply of well-fitting "shooting" glasses at a proper time.
>
> Exact observance of the rules is demanded, in order to limit to the minimum any separation of troops from front-line or other service.
>
> Requests for provision of glasses will be forwarded, classed as *urgent request*, by *courier mail*, by all officers concerned.

Beginning in 1914, and in greater detail in 1915, the German General Staff dictated the type and price of glasses for all soldiers, and designated one or two official opticians to supply glasses and adjust and repair frames in every large town of the empire. At first an excellent nickeled steel frame was furnished; but owing to the scarcity of nickel after 1916–17, cobalt or tin was used, giving a dull "field-gray" finish, desirable because it did not tarnish or cause irritating reflections in the wearer's eyes. Following are extracts from an order of the Medical Section of the War Ministry, dated at Berlin, August 30, 1915:

> To the end that those needing glasses may be provided with same at the place of enlistment before departure for the zone of operations, it is ordered:
>
> 1. Department surgeons will designate several qualified opticians in each large enlistment center, to furnish spectacle lenses and frames according to the models in the Field Optical Chest. Two samples of spectacles (for high and low nasal bridge) will be forwarded to each Department Surgeon by the Chief Sanitary Depot in Berlin, on receipt of price.
>
> 2. The following prices, considering present costs of raw material and labor, will be permitted for finishing and fitting individual spectacles of this kind: Spectacles with meniscus (curved) lenses ranged in price from 75 cents for weak spherical lenses to $2.05 for strong compound lenses. (These prices went up 30 per cent in 1916 and 100 per cent in 1918. The Germans never used flat lenses such as were necessarily used in the American army, because they were said to distort objects seen through the outer part of the lens, thus interfering with marksmanship. This was an important point where so many Germans with high myopia were used at the front.)
>
> *Lenses.*—(*a*) Round shape, 38.2 millimeters diameter; (This difference from the 40-mm. British and American shape prevented use of large captured stocks of German cut lenses); (*b*) Curved lenses (meniscus or toric); (*c*) Angle for edge of lens, and the corresponding angle inside rim of frame, 120 degrees.
>
> *Frames.*—In their selection, attention must be paid to (*a*) Exact pupillary distance; (*b*) correctly chosen bridge; (*c*) suitable distance of lenses from cornea (about 12 mm.); (*d*) correct length of temples.

A form on which indorsements must be made by the optician and regimental surgeon concerned insured correct fitting before the optician's bill could be settled by the Department Surgeon or military hospital concerned.

Glasses which could not be replaced from the Field Optical Chest, namely, very strong spherical or cylindrical lenses, or compound lenses, were ordered in duplicate and carried on the person of the soldier needing them. Company surgeons were held responsible for constant possession of two pairs of glasses by such soldiers. The prescription for all glasses, with style of frame needed, was copied on a paster which was placed on a certain page of the soldier's pay book. This prevented the necessity of trips for reëxamination in case of loss or breakage. This provision was adopted in the American forces too late to do much good.

The inception of gas warfare in 1915 caused a change in all frames provided for soldiers at the front. The new type, so-called *Maskenbrillen,* had tape loops to go over each ear and lie flat against the cheek, thus permitting wearing the gasmask over the glasses. It was issued at once to—

> all assigned to combat troops, all formations active or likely to act in the zone of operations, and all replacements for such organizations. Non-combatant replacements will be provided with M-glasses (mask-glasses) when they receive gas drill and equipment.
>
> Gas mask wearers will receive only the M-glasses, and will not be permitted to retain a second pair of ordinary riding bow glasses.

Construction of the German gas mask, without nose clips, and with its non-steaming replaceable celluloid windows, facilitated wearing glasses under the mask. So many German myopes were helpless without glasses that such an arrangement was imperative. Comparatively few front-line American soldiers needed such strong glasses; but enough were discovered among replacements and in the noncombatant services to necessitate some provision of this sort in our forces. The writer improvised an arrangement for a good many myopic officers and men by affixing an extra pair of lenses slightly weaker than the normal correction to the outside of the gasmask windows, by means of adhesive or electric tape. Obviously the tight American or British mask, with its side pockets for wiping off condensation steam, precluded the wearing of glasses inside. Just before the armistice, a number of pairs of lenses set in thin brass discs adapted to be snapped on over the gasmask windows were devised by Major Edmonds and delivered at our front. Calling of older classes to the colors in the United States would have meant the provision of many more devices of this type, for which arrangements were being made.

The German Field Optical Chest, which corresponded somewhat to the American auxiliary optical unit, was "furnished to every division surgeon and every surgeon of a group of formations of divisional importance." Field optical chests were transported with the troops to which they were issued, while the American optical units, with an enlisted optician in charge of each, were fixtures in certain groups of base hospitals, many miles away from the front. Provision for American field outfits was under discussion when the armistice came.

The field optical chest contained: 84 frames, in ten different styles of bridge and pupillary distances; most frames were the Mask type, and these were issued in a japanned steel case containing an extra pair of tape ear-loops and a threaded needle for sewing on the same—efficiency! (The American system provided only three types of bridge, readily adjustable to any face).

Two hundred and eight pairs of lenses, as follows: minus spheres, up to 10 diopters, 139 pairs; plus spheres, up to 7 diopters, 37 pairs; minus cylinders, up to 4 diopters, 12 pairs; plus cylinders, up to 3 diopters, 6 pairs; plain glass for unilateral defects, 5 pairs; black and gray lenses for those needing protection against light, 9 pairs.

As commonly in continental practice, correction of defects in quarter diopters was not made, and compound corrections for accurate relief of astigmatism were rarely given. Such lenses were only obtainable by special order on the main sanitary supply depot in Berlin. Provision of such special orders, as well as speedy replacement of lacking supplies in the Field Optical Chests, was facilitated by use of courier mail, and delivery was hurried in every way. This formed a notable contrast to the mail delay of three and four weeks in delivery of necessary glasses to soldiers at our own front. Ophthalmologists closest to the front lines were constantly made aware of instances of interference with the efficiency of soldiers from this cause, during the busy summer and autumn campaigns of 1918. Map artists, photographers, intelligence experts, artillery and aviation machinists, ambulance drivers, engineers, and many other specialists engaged in necessary work among the combat divisions and at field headquarters, were more or less incapacitated because they had not been provided with duplicate glasses, and were delayed in getting broken ones replaced, whether the prescription was known to them or not.

The German paper work connected with the supply of glasses was cumbersome, involving many signatures and indorsements. Their system of supply by private firms required strict inspection, and much scrutiny of accounts, although it insured competent adjustment.

Features of the German system which were under examination by American authority when the armistice came, include the field optical chests; compulsory provision of glasses with duplicate pair in case of difficult correction, before entering the zone of operations; use of meniscus or toric lenses, thus reducing distortion of images through the periphery of the lenses; dull-finished frames; provision for glasses to be used with gasmasks; positive orders that glass prescriptions must be recorded in the paybook, and that regimental surgeons must be responsible for a check on possession of glasses by those needing same; speed in manufacture and mail delivery of glasses. These advantageous points were made easy for the Germans by their proximity to sources of supply and their autocratic control of all private enterprise.

It was often felt by American ophthalmologists working under unavoidable difficulties in France that such points as these should receive careful consideration in their appropriate place in the plans for future military and physical training of the youth of the United States. A soldier's eyes may produce far more discomfort than his feet, and they surely merit almost as much consideration when anything goes wrong.

THE RELATION OF DEFECTIVE MENTAL AND NERVOUS STATES TO MILITARY EFFICIENCY

Honorable Mention, Wellcome Prize Essay, 1919

By Captain FRANK GARM NORBURY
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Introduction

PART I

THE relation of nervous and mental diseases to military efficiency gained its place of importance really for the first time during the World War. We have statistical data of some length, with observations thereon, appearing in the Medical and Surgical History of the Civil War. Studies of a similar nature appeared following the Spanish-American conflict. Accurate data were compiled and quite careful considerations given to the care and handling of nervous and mental disorders, both by Russians and Japanese, during the war between these nations. The advances made by this study in these intra- and international strifes correspond with progress in that branch of the art and science of medicine known as neuropsychiatry.

It is but natural, then, to expect that, as further advances were made in this branch, attention in increasing amounts would be directed towards the subject in the forces of different nations. That this is true of the United States is well shown by publications from the service appearing before the World War. Some of these are reviewed in that excellent bibliography with abstracts, "Neuropsychiatry and the War" (1), prepared for the National Committee of Mental Hygiene by members of its staff.

However, it was with the World War that the great impetus was given to the subject as a whole. The vast numbers of the forces, the conditions of warfare, the temperaments of the different nationalities involved—all have been discussed with force and clarity in their relation to different phases and do not come as such within the scope of this paper. These considerations, together with those bearing on previous conflicts, will not therefore be considered save perhaps in relation to the recent conflict. The discussion will deal essentially with certain features brought out in it.

A great mass of literature dealing with the various clinical pictures produced under the heading of nervous and mental diseases has appeared. The psychoses and neuroses, especially the latter, have been studied in detail by the foremost workers in the various countries concerned, with the result that is an affirmation of the principles of neuropsychiatry and an invaluable contribution to our experience in, and knowledge of, the situations. Statistical studies, clinical observations with elaborate case reports, psychological data, analyses of and deductions from the varied situations arising in these cases with explanations of the mechanisms involved, outlines of procedure to be followed for classification and elimination of the different types, methods of general and individual treatment, both immediate and prolonged, all form in a way the great groups of books, monographs, lectures and articles that have been published.

The consideration of our subject demands something from each of these groups. By reason of more general interest and of more personal knowledge, this paper will deal in a large part with conditions affecting the United States forces. Statistical tables, showing the eliminations by local boards and recruiting offices, the rejections at the cantonments either shortly after entrance into service or at periods before the departure of units overseas, tabulations of cases rendered unfit by illness while in training or at rest areas in Europe, as well as the actual battle casualties resulting from disorders of the nervous system, would not, in our opinion, of themselves, deal sufficiently broadly with the subject. The other groups must be considered for an understanding of them with their important relation to the disorders producing the non-effectives is essential for an explanation of certain phases.

There is in addition to the actual number of non-effectives due to nervous and mental conditions and the decrease in military strength, due to their presence, another element in the situation. This is in regard to the matter of morale, that intangible, yet very definite something, by reason of its presence or absence meaning the life of an organization.

The writer had occasion at one time to note that a detachment of men, hitherto full of snap and vigor in their whole military life, had one day apparently gone to pieces in their evolutions. The same officer and drill sergeants were in charge as on previous days, and nothing in their actions was accountable for the change. The majority of the men wore worried, anxious expressions; their thoughts appeared to be anywhere but on the formation. Recall was therefore soon sounded, and after dismissal of the detachment it was noticed that little groups of men gathered together in serious conversation. It was learned within a short time, from the detachment commander, of the presence, by recent transfer, of two suspected defectives in the detachment, and the rest of the men, clean college boys younger than the average National Army soldier, were all greatly concerned thereby. With the transfer to the hospital for psychiatric examination there was an immediate resumption of the former spirit. If incidents of this nature occurring in camp life in this country could so affect the morale and efficiency of a detachment;

it is readily seen that, under conditions of warfare, a comparable situation might have considerable influence at a time when there is greater need for the proper *esprit.*

Other factors entering into the importance of nervous disorders in military service include among their number the adaptation of the individual to circumstances, the resistance to strain, the responsbility that is thrown upon one or more men and particularly upon officers, the matters of quick decision and prompt action—all of which appear more in association with the psychological makeup of the individual and the importance of finding for him his proper place in the great organization.

A study of the subject as a whole is impossible in a paper of this kind, especially at this time. The war is still too recent a matter for us to be able to give a sufficient résumé in this or any other subject related to it. Many of the statistical findings are at present in the process of compilation and analysis. The literature on the subject is already voluminous, some good, other portions not so satisfactory. For this discussion emphasis is laid upon certain of the more outstanding contributions, though not considering those that have not been mentioned as unworthy. Bibliographies and abstracts have been freely drawn upon where originals are not available. Statistical information is based on official reports directly where possible, otherwise on abstracted or quoted material. Unpublished and personal communications are used to some extent. Finally, a few observations based on cases that have come to the writer's attention are interposed as fairly typical examples of disorders arising under different conditions, and which individually or en masse play a part in the efficiency of military service.

PART II. EXPERIENCES OF OTHER NATIONS

(*a*) *Allies*—The experience of the Allies, and in some instances of the Central Powers, was of inestimable value in this as in other fields to the United States when the declaration of war brought this country actively into the conflict.

No one who has been in France and has there become acquainted to some extent with the work of the French can help having admiration for their care of cases of nervous and mental disorders. The conception of treatment of the war neuroses in the advance zone arose, we understand, with the French. The monographs in that valuable Collection Horizon were of great benefit in the search for medical literature in the towns in the provinces, especially before the distribution of the Research Bulletin became systematized, and the members of this series dealing with our subject, "The Psychoneuroses of War" by Roussy and Lhermitte (2), and "Hysteria, or Pithiatism" by Babinski and Froment (3) offered much of interest and understanding.

Chavingy (4), in speaking of the care of the neuropsychiatric cases "comments on the difficulties involved at first in bringing different groups to a realization of the necessity for special services" and the constantly increasing need to date (1915) for such services. That the need continued throughout and until the recent demobilization of the French Army goes without saying. He classified three periods of evoution into mental troubles: (1) Mobilization, with its problems of alcoholism; (2) period of devastating warfare; (3) period of trench warfare, especially with the increased use of high explosives, and their concomitant effect developed during this period. Emphasis in regard to treatment is laid on early diagnosis and prompt and specific therapy, causing many to be returned to the front early. Roussy and Lhermitte (*loc. cit.*, p. 163) say: "The degree of curability is inversely proportional to the duration of the disorder."

Further emphasis on early treatment is given by Dejerine and Gauckler (5). Leri (6), reporting on the value of treatment of the neuroses at a special center in the Zone of the Armies, states that 91 per cent of the cases at the neuropsychiatric center of the Second French Army, in the period from June to October, 1916, were returned to the line. Confirmation of this is given by numerous other authors. Truly this is an advancement in the question of efficiency and productive results.

The organization used by the French in handling these cases in the Zone of the Armies is described by Roussy and Boisseau (7) and Damaye (8). The treatment is discussed in detail by Roussy and Lhermitte (*loc. cit.*, pp. 159 *et seq*).

Definite statistics on numbers of cases of neuroses were not found for the French; these relative figures are given because of their value in showing what efficiency can be obtained for military service by prompt diagnosis and treatment. For the psychoses one statistical study is given herewith (Table I), more, however, for the conclusions of the authors, Regis and Charpentier (9), that active service had not augmented very perceptibly, at least in the French Army, cases of actual insanity.

The only information available for our object from Italy is contained in a report of the organization of the medical service of the army by Naccarati (10). The scheme of organization of the neuropsychiatric service is outlined. The statement is made that about 20,000 patients were admitted in a year to the psychiatric and neurologic reserve hospitals. This number does not include those successfully treated in the advance centers.

Numerous reports from Russian sources are abstracted in "Neuropsychiatry and the War," but an effort to correlate these in regard to statistical information leads to confusion and manifest lack of success. This was due to lack of organization and registration of cases at the onset, and since the Russian debacle no worthwhile information is at hand. One interesting piece of information revealing the extent to which entrance into the army of the unfit and thereby raising the non-effective rate is reported by Timofieyeff (11), revealing the high percentage of chronic cases in the Russian armies, thus having a very definite bearing on military efficiency. This is one of the strongest arguments for thorough initial examination, though under the Russian organization such a procedure was impossible.

The experiences of the forces of the British Empire have, by reason of the closer relationship between them and the Americans through the bond of the same tongue, an important place in our subject. Canada's contributions have been of value, while our whole system of organization in the Expeditionary Forces especially has certain fundamental policies based on the British experiences.

An important Canadian observation is that of Farrar (12). While it offers little in the way of statistics, it speaks convincingly of the realization of the Military Hospitals Commission of the necessity of the care of cases invalided to Canada, and of the part that nervous and mental diseases play in military situations. The monograph is exceedingly valuable from the clinical standpoint.

The number of such cases assumes its importance when we learn from Sexton (13), in his position as vocational officer of the Military Hospitals Commission of Canada, of actual figures: "In Canada over 10 per cent of all the 25,000 men who had returned up to October 1, 1917, were classified as mental cases. If those who were returned as over-age, under-age, and for duty are excluded, the mental cases represent 15 per cent of the invalids, and if those suffering from actual wounds are not counted, the mental cases constitute 25 per cent of all those returned from the Canadian Army in England and France." Up to this time 400,000 soldiers made up the army Canada furnished. "From a purely military point of view, this factor of war neurosis is highly important where so many men have to be discarded from mental causes."

We recall further in the discussion, in regard to the establishment of a Division of Psychology in our own Medical Department, some statements as to Canada's experiences. In the rush of enlistments early in the war, before the organization had been perfected, cases which later would not have been accepted were received, and which later on necessitated a weeding out and invaliding back to Canada for care on account of mental inadequacy.

The British early recognized the importance of the cases of nervous and mental diseases in their forces. The names of Mott, Aldred Turner Marr, Rivers, Myers, Hurst, and a host of others are associated with the high stage of development neuropsychiatry reached in England in war time. Books such as Mott's "War Neuroses and Shell Shock" (14), which is a compilation of his various monographs, lectures and publications; Marr's recent volume "Psychoses of the War" (15); monographs, case reports and clinical communications of other English authors form the basis of much of our understanding of this highly specialized branch of medicine.

Kay (16), writing in 1912, gives data as to the frank psychoses in the British Army before the World War. His figures for the army for 1908, under the voluntary enlistment system, show a rejection of 54 or 0.88 per thousand of 61,728 recruits at inspection, with an additional rejection of 71 or 1.16 per thousand three months after enlistment.

We have no figures as to rejections during mobilization of the "new army," simply a general statement that many cases were weeded out in the early stages of training. The varied psychological reactions and adjustments that must be considered in training and which make for the "good soldier" are explained by Rivers (17). He considers most of the faulty adjustments due to enhanced suggestability resulting in an anxiety neurosis. More is gained in prevention of the neuroses with their resulting noneffectiveness, in instilling morale, than in treatment, once they are under way.

An interesting commentary on the incidence of insanity among the civil population in war time, that should be taken in connection with a summary of military cases of neuroses and psychoses, is shown by Table III. A decrease of over 3,000 a year from 1914 to 1916 is of significance when the large number of recoverable cases in the military group is considered. For army cases, a representative group is the one set forth by Hotchkiss (18) at the Dykebar Hospital—an analysis of 942 cases admitted and 500 discharged (Table IV) and that of Eager (19) at the Lord Derby War Hospital (Table V).

To come again strictly within the limits of our subject, we must consider the organization and care of nervous and mental disorders in the British Army, with the view of changing non effectives to effectives as soon as possible. It is from the report of Col. Thomas W. Salmon (20) that we secure our most valuable data. This report will be referred to again in discussing the American phase of this subject.

> During the year ending April 30, 1916, approximately 1,300 officers and 10,000 men were admitted to the special hospitals for shell shock and neurasthenics. The 1,800 beds in these special hospitals constitute less than one-half the total provisions in Great Britain for such cases. It is the belief of those who have made an effort

to ascertain the prevalence of the war neuroses that the rate among the expeditionary forces is not less than ten per thousand annually, and among the home forces not less than three per thousand.

Early in the war it was found that speed of recovery took place proportionally to time of onset of treatment, in most neuroses. Gradually the place for institution of treatment was moved nearer the front, with increasingly favorable results. Table VI shows the percentage of recovery, to the stage of fit for duty, of groups of cases at different posts along the line.

Notwithstanding all the improvements in diagnosis and treatment of these situations the number of cases is very large. The part these played in actual numerical loss is of great importance in relation to numerical loss. Col. Sir John Collie, president of the Special Medical Board for Neurasthenia and Allied Nervous Disorders and Director of Institutions for Neurasthenia, estimated in June, 1917, of the 160,000 to 170,000 pensioners, 20 per cent were suffering from functional nervous disorders (21). Marr (15) alone speaks of observations on analysis of the exciting causes of 3,000 cases of neurasthenia and similarly of 3,775 cases of mental affection, exclusive of neurasthenia and psychastenia, while Read (22) speaks of over 3,000 cases.

(*b*) *Central Empires*—As to the Central Empires, probably the best statistical information is the article of Birnbaum (23) abstracted and reviewed by the late Dr. August Hoch, in which relative percentages of the different types of mental disorder are given. That the numerical element is of importance is brought out by Meyer's article, the only one in which total figures are given in the abstracted portion, 1,126 cases being admitted in one year (Table VII). Stadelmann (24) reported that in the reservist hospital under his care neurasthenia accounted for as many medical casualties as all the other complaints put together.

PART III. EXPERIENCES OF THE UNITED STATES

The purpose of the discussion of the experiences of the other nations has been to lead up to the handling of the subject in relation to the United States. Information accessible by reason of the two and one-half years of war before this country entered into it was of greatest value in this as in other phases of the great conflict. Furthermore, accurate and more recent statistical data are available in official reports and other communications.

Before the war, the United States had gone far in the studies of cases of nervous and mental diseases in the forces. A monograph on army situations appeared from the Surgeon General's office in 1914, by Captain King (25). Particularly valuable are the statistical and clinical studies of Butts (26) and the applications of the tests for mental deficiency in recruits reported in the Navy by Jenkins (27), Schier (28), Royal (29) and others.

The statistics of admissions and discharges for mental alienation per 1,000 mean strength in the Army over a period of years appear in Table VIII. The increase shown by the expansion of the Army under war conditions stands out graphically over the normal peace ratio.

Once the United States had entered the world conflict, plans were at once realized for the care of these situations. Many of these plans had been formulated previously, through activities of different natures, and to put them into effect was the matter of initiating features already organized. On account of the relatively greater importance our subject lays on military service, entry and casualties, hereafter the Army alone will be considered.

The Surgeon General of the Army early realized this importance. The National Committee for Mental Hygiene and the special scientific associations offered their services, which were accepted. The work was correlated through the War Work Committee of the National Committee. Dr. Thomas W. Salmon, Director of the National Committee (Colonel, Medical Corps), served first in the Surgeon General's office, then later became Senior Consultant in Psychiatry of the American Expeditionary Forces.

The early conferences resulted in the organization of the Division of Neurology and Psychiatry of the Surgeon General's Office. This division was in charge of the neuropsychiatric service of the Army, instituted plans for examination of registrants for the New National Army, arranged for detailed examination and care at the cantonments, including installation of special equipment in neuropsychiatric wards, and called for specially qualified physicians to serve in this division. One of the most far-reaching early movements was Colonel Salmon's inspection of the organization and hospitalization of cases of nervous and mental disease in the British forces. This report (20), with such modifications as our own system demands, forms the basis of the organization of the care of such cases in the United States Army in this country, and especially in the American Expeditionary Forces. It will frequently be referred to.

A summary of the military purpose of the division is found in the report of the Surgeon General (30) for 1918.

> The experiences of the past year have shown the military and economic necessity of excluding from fighting forces nervously undependable and unreliable persons, and it would seem now to have been definitely demonstrated that neuropsychiatrists should constitute about 3 per cent of every Army Medical Corps, and that they

> should be particularly well represented at all points of enlistment. The chief functions of a neuropsychiatric department are therapeutic and preventive; of these the therapeutic is the least important from the military point of view. . . . With the exception of the war neuroses, the chief military importance of the therapeutic activities of the neuropsychiatric branch of the medical department is the increased effectiveness in evacuation it insures. . . . But the real value to an army of neuropsychiatrists is the prevention of the occurrence of nervous and mental disease among troops. . . . Another function of psychiatrists has been to assist in the attainment of military justice.

The first line of defense of the Army against the introduction of cases of nervous and mental disease into it did not, however, come within the province of the Surgeon General's Office directly. Under the selective service act, this came into the medical examination of registrants in classification as regards induction. The agency was the medical division of the Provost Marshal General's office (31). Standards of fitness were determined by the Surgeon General, and the reports transmitted from the Provost Marshall General down to the examining physician of the local board. Usually, on the medical advisory board of a community or district, one of the physicians was a specialist in nervous diseases or had some experience in them.

Rejections for outstanding nervous or mental defects were made by the local or district boards, on recommendation of the examiner or of the medical advisers. When large numbers of registrants had to be examined in a short time, the necessary observations for many nervous and mental situations could not be made, or, as was frequently the case, a personality apparently adequate in civilian life could not adjust to military service. For one reason or another there were many rejections of men passed by the boards but eliminated by the military medical authorities, either by rejection on entrance to camp or later on, after acceptance to the camp, when defects appeared. The statistical data of these discharges are appended in Tables IX and X. These tables and others are either copies of data or correlated summaries of the first (32) and second (31) reports of the Provost Marshal General, the report on physical examination of the first million draft recruits, issued by the Surgeon General (33), the reports of the Surgeon General (30), and such other communications as give accurate data. At the time of the first report of the Provost Marshal General, the evaluation of the findings had not taken place to an extent for publication at that time. Consequently no statistical data are used from this report. Certain figures comparable for this period are, however, available from a paper by Colonel Pearce Bailey on the care of the military insane (34) (Table XI). This paper states that disqualifications based solely on the existence of nervous or mental disease or defect have been found in from one and one-half to 5 per cent, varying with the organization examined. The further statement is made that nearly three-fourths of the recommendations made by the neuropsychiatric examiners were for conditions primarily mental, as opposed to organic disease or defect of the nervous system.

The second report of the Provost Marshal General covers the registration of the total period, with special reference to operations after December 20, 1917. This, when studied in connection with the report on the first million men, give an excellent idea of the problem and of the results secured. The figures of these two reports overlap in many instances, of course. The Provost Marshal General's report covers the examinations before induction, while the bulletin from the Surgeon General's office deals with cases arising early in army service.

The first line of defense of the Army against nervous and mental disorders protected it from the entrance of 24,362 probably complete noneffectives by rejection within the jurisdiction of the local boards, during the period covered. It is impossible to give, from figures at hand, those rejected during the elimination and classification of the first draft by local boards. A fair assumption is that the percentage of rejection by local boards on the first draft, being essentially the same as on the second and third, and that the qualifications in regard to mental state remaining the same, the absolute number would vary roughly with the absolute number of total rejections. On this hypothesis, approximately 10 per cent of the rejections by local boards would be the number for nervous and mental disorders. This is undoubtedly high, as the more strict regulations for other defects in the first draft would tend to lower the percentage. Assuming that the ratios given on a selected group studied in the first draft held throughout, the total for nervous and mental diseases would amount to a little over 8 per cent, or 58,000. (For calculation see Table XII.) This would make, then, over 80,000, or more than two full divisions, probably complete non-effectives eliminated early from the Army.

An additional 13,612 were rejected in the second draft by the second line of defense, the examinations held at the camps under the direction of the camp or division surgeons. Probably a proportional number fell under the first draft. Thus we see the value of the special neuropsychiatric boards in the Depot Brigades.

The discharges from the Army, after acceptance, but within the training period, can be obtained from several sources (*cf.* Tables IX and XI). Approximately 23 per cent of the total discharges during this second period of classification were for nervous and mental disorders. Many of these cases were, from our general knowledge of such conditions, apparently fairly adequate in civil life, but were not adequate to meet the strain of a changed manner of living, of making adjustments to new situations, and by virtue of their makeup were forced into "flights into unreality" with this result.

Thus we see that either mental inadequacy or potential nervous and mental disease was kept out in so far as possible—the outstanding cases held up by the local boards, the fairly well-defined ones stopped at camps, and those requiring an incubation period for manifestation developing for the third group.

A method of importance in eliminating the mentally defective recruit was that of the psychological examination. At first this was considered more or less experimental, but its results were so important and far reaching that after a preliminary period, in which the understanding of all features had to be secured, this was made a part of the examination upon entry into service at many camps. The organization of this work was at first carried out under the division of neurology and psychiatry and psychology. The scope of the work enlarged until a special division of psychology was created in January, 1918. The results of the examinations were of value in eliminating men mentally defective, in balancing the mental strength of organizations, in classifying men for the assistance of personnel officers, and in indicating potential candidates for officers' training camps. It is with this first group that we are primarily concerned. The note of the division in the report of the Surgeon General shows that by July 1, 1918, approximately 600,000 men had been examined. One-fourth of 1 per cent had been recommended for discharge, and about one-half of 1 per cent had been recommended for home service in development battalions.

Major Yerkes, chief of this division, estimated that 1 to 1½ per cent of recruits at mobilization centers were rejected for mental deficiency under psychological examination. These figures are included in the total rejections, but the proportion ruled out by these special examinations shows the value of eliminative procedures of this type. Furthermore, an additional one-half of 1 per cent who were mentally inferior, but not completely inadequate, were transferred out of combat organizations to service groups or development battalions.

Further protection for the combat forces was secured by the recognition by the General Staff of the Army of the importance of the mental state of the commands, and the assignment to each division of a medical officer as division psychiatrist. The duties of these officers, as stated in the official circular (34), are as follows:

1. To examine or cause to be examined all cases of mental and nervous diseases occurring in the command.

2. To be available for all special neuropsychiatric examining boards

which may be convened from time to time for the purpose of examining the command.

3. To ask for the assignment of regimental surgeons to assist in the neuropsychiatric examination of recruits, this latter largely for the purpose of instruction of regimental surgeons.

4. To supervise the making of all reports of examinations in his specialty, and the forwarding of them to the Surgeon General.

5. To see to it that the recommendations of neuropsychiatric examiners are promptly prepared for forwarding to general disability boards.

6. To hold from time to time brief informal conferences with regimental surgeons and company commanders in relation to the general subject of military neuropsychiatry.

7. In cantonments to be available for consultation with medical officers stationed at base hospitals.

8. To visit frequently regimental infirmaries and, whenever invited, the nervous and mental wards of base hospitals.

9. To coöperate with judge advocates for the purpose of establishing in every division a method of treatment of delinquents similar to that in successful operation at the Leavenworth Barracks. As a result of this method, many cases of mental disease may be counted upon to be discovered and recommendations to be made that the charges be dropped and S. C. D. Board convened, or that the case be tried, and if a sentence and findings be imposed that the findings of the court be approved (including discharge) and that the confinement be remitted.

10. To be consulted in reference to service battalions, should such service battalions be established in connection with depot brigades or base hospitals.

11. To coöperate with psychological examiners, and, if practicable, to arrange for psychiatric and psychological surveys of troops to take place at the same time and place.

Thus the division psychiatrists keep in touch with the mental state of the organizations and are a factor by promoting mental hygiene and increasing military efficiency. "Reports from the expeditionary force indicate that they have been a great assistance in preventing the occurrence of the war neuroses by their knowledge of the troops with whom they have already served for months during the training area" (30, p. 688).

Included among the functions, therefore, of the division psychiatrist was the report of the overseas examination, conducted by a Neuropsychiatric Board. Those of us who went to France well remember that among all the other details in the preparation for departure this overseas examination, in which our typhoid prophylaxis cards, or for enlisted men the service records, had stamped "Examined and passed by the Neuropsychiatric Board May 5, 1918," had to be arranged for. The writer was told by a former member of such a board that the number of rejections by these boards varied roughly inversely as the length of stay in camp, and for that division (76th), which had been in training some time, there were less than one hundred such rejections. These examinations were further manifestations of the effort to keep potential mental cases out of the American Expeditionary Forces.

Notwithstanding all the care exercised in the United States, there were of course many cases of nervous and mental disorder arising overseas, for the most part battle casualties, though some developed symptoms without ever having been near the front. Bailey (*loc. cit.*), in an article previously referred to, states that among the returns for wounded, in the earlier part, most of them had departed for France before the neuropsychiatric examinations had been instituted. "The percentage of nervous and mental disease is twenty-five, a percentage that seems destined to decrease as the figures more and more concern the examined army."

The arrangements for care of these cases in France, under the direction of Colonel Salmon, form one of the outstanding features of the work of the medical department. These in general followed the recommendations he made after his inspection trip referred to above. The recommendations were:

Overseas

1. *Base Sections of Lines of Communication.*—(*a*) A special base hospital of 500 beds for neuropsychiatric cases, located at the base upon which each army (500,000–600,000) rests. These special base hospitals to be used for cases likely to recover and return to active duty within six months. Other cases to be cared for while awaiting to be evacuated to the United States.

(*b*) One or more special convalescent camps in connection with and conducted as part of each special base hospital.

2. *Advanced Section Lines of Communication.*—(*a*) Special neuropsychiatric wards of 30 beds, in charge of three psychiatrists and neurologists, for each base hospital having an active service. These wards to be used for observation (including medicolegal cases) and for emergency treatment of nervous and mental cases.

(*b*) Detail of a psychiatrist and neurologist attached to the neuropsychiatric wards of base hospitals to evacuation hospitals or stations further advanced, as opportunities permit.

The changes made necessary in these recommendations due to military reasons and to military-medical problems are outlined by Schwab (36), and by editorial comment in the January, 1919, number of *Mental Hygiene* (37). A description of the features of the neuropsychiatric organization of the A. E. F. in actual practice, the special base hospital, Base Hospital 117, and of the methods and treatment employed are also given by Schwab (*loc. cit.*) from whose article much of the material immediately following is collected.

The advances of the allied line and the difficult medical conditions showed that forward screening was necessary for the proper care of the cases. In the campaign in June and July the percentage of cases considered war neuroses ran as high in some instances as one out of five casualties. To meet these conditions in the other campaigns, forward neurological hospitals were established and, furthermore, division psychiatrists were stationed in the triages or most advanced field hospitals. The results of this system were brilliantly successful. During the St. Mihiel-Argonne operations, two army neurological hospitals were in use.

Statistical data of this period (37) show that 3 to 12 per cent of the total casualties were from concussion or functional nervous disorders—the number approximately 7,500. The average results of treatment under the organization is shown in Table XIII for cases in the first Army. In some instances 80 per cent of the cases were returned to the front from the triages after treatment of less than three days. Where evacuation was slower, results were not so favorable.

All cases referred to the base were supposed to be sent to Base Hospital 117. Some, of course, escaped, especially during the earlier period. In all, about 3,000 cases passed through this hospital. The results of these are quoted from Schwab:

> In a general way, it may be stated that about 65 per cent of these patients were returned to the class of active duty, either to front line work or to camps and stations preparatory to this. About 30 per cent of them were sent to S. O. S. duty, and the remainder were included in the class totally unfit for military duty of any kind. In this last class, in the early history of Base 117, there were no instances of war neuroses, but only such cases of organic nervous disease and mentally deficient individuals who had been sent there unrecognized or wrongly diagnosed.

As to the returns for total incidence from the American Expeditionary Forces, certain figures are of importance (38). Of medical cases 17 per cent are nervous and mental disorders, a larger proportion than any other class of cases, tuberculosis not excepted, and 6 per cent of all cases, medical and surgical, come under this heading. Approximately 3,000 such cases were returned to the United States (39).

The after-care of such cases as require treatment has been turned over by the Army to the United States Public Health Service, operating as the medical division of the Bureau of War Risk Insurance. That the principles and understanding of this type of military medical disorder gained through the experiences of the war will be made use of in classification and treatment goes without saying.

SUMMARY

A review of the experiences of other nations in the handling of nervous and mental diseases in the forces has been given. The results in relation to military efficiency depend on the care in organization, separation of the inadequate personalities, and treatment of the battle casualties as they arise. The value of care at recruiting depots is shown by the unfavorable results where such care is not exercised (Russia). For battle casualties, the prompt diagnosis and early treatment greatly increases the number of effectives.

An outline of the organization in the United States Army has been given. Statistical figures of the elimination of defectives at the time of mobilization, and at the camps thereafter, thus reducing potential non-effectives, have been quoted. The results of such elimination have been to make "the rate for mental diseases in the A. E. F. the lowest in the history of any expeditionary force" (39). The scheme of treatment of battle casualties of war neuroses and the increasingly favorable results in relation to military efficiency have been delineated.

CONCLUSION

The importance of the relation of nervous and mental diseases to military efficiency lies chiefly in the numerical factor, not only in time of military operations but in the problem of after-care and post-war adjustments.

TABLE I.—*Statistics of Cases at Central Psychiatric Service of Bordeaux from August 20, 1914, to January 31, 1916* (9)

Number of soldiers received		1,232
Insane from among these who were sent to the interior (internes) (5.6 per cent)	69	
Military Classification of Internes:		
Active service	8	
Reserves of the active service	32	
Territorials	22	
Reserves of the territorials	7	
Source:		
From the front	47	
From stations in the interior	21	
German prisoners	1	
Clinical Forms:		
Mania	11	
Melancholia	24	
Post confusional insanity	1	
Post confusional melancholia	4	
Mental confusion with agitation	1	
Post-nervic delusions of persecution	1	
Chronic hallucinatory psychosis	3	
Delirium	2	
Dementia praecox	9	
General paralysis	3	
Organic dementia	1	
Alcoholism	8	
Agitated state, perhaps simulated	1	

TABLE II.—*Table Showing Incidence of Types of Mental Disorder in Russian Army* (11)

	Per cent
Epileptics	13
Traumatic psychoses and neuroses	1
Acute hysterical psychoses	1
Acute psychoses (amentia, manic-depressive, acute paranoia and dementia praecox)	30
Chronic disorders	20
Others (questionable, not specified)	35
Total	100

TABLE III.—*Third Annual Report, Board of Control, Great Britain,* 1916.*

Notifiable Insane Persons

1914	140,466
1915	137,188
1916	134,029

TABLE IV.—*Diagnosis of Cases Admitted to Dykebar War Hospital, Paisley, during Year* 1916–1917 (18)

		No.	*Per cent*
Manic-depressive		188	21
Manic type	31		
Depressive type	133		
Stupor	7		
Mixed type	17		
Alcoholic		152	18
Mental deficiency		151	18
Confusional		134	16
Dementia praecox		118	14
Catatonic form	11		
Paranoid form	14		
Simple form	93		
Paranoia		44	5
General paralysis		22	2
Other organic brain conditions		5	Less than 1
Epilepsy		7	Less than 1
Secondary dementia		7	Less than 1
Not insane		4	Less than 1

TABLE V.—*Summarized Record of Admissions and Discharges, Lord Derby Hospital, Warrington, England* (19)

Admissions		2,429
Discharges		1,466
To civil occupations	823	
To asylums	154	
To other hospitals	224	
To home duty	247	
Died	18	

TABLE VI.—*Percentage of Return to Front of Neuroses at Different Hospitals, Compiled from Salmon* (20).

Hospital	*Type of case*	*Per cent fit for military duty.*
Maghull	Severe in chronic neuroses	20.9
Ramsgate	Considered recoverable within 6 mo.	60 plus
Casualty clearing station	Acute	66

Table VII.—*Relative Frequency of Disease Groups in the German Army* (23).

	During war			During peace
	Bonhoffer	Meyer	Hahn	Stier
Psychopathic constitution, hysteria, neuroses, etc	54	37.5	43	17.5
Alcoholism, chronic and acute	10	21.5	21	
Dementia praecox	7	7.5	13	35
Epilepsy	14	11.5	8	12
Manic-depressive insanity	3	4	2	9.5
General paralysis	6	3.5	3	

Table VIII.—*Incidence per* 1,000, *Mean Strength of Cases of Mental Alienation in U. S. Army, Years* 1912–1917.

(Reports of the Surgeon General, years 1912–1916;* year 1917, compiled directly Tables XV and XVII.)

Year	*Admission rate*	*Discharge rate*
1912	3.26	2.78
1913	2.92	
1914	3.83	3.02
1915	3.04	2.54
1916	3.73	2.65
1917	7.03	3.66

Table IX.—*Mental and Nervous Disorders as Cause for Rejection by Local Boards and Camp Surgeons and for Discharge from the Army, February* 10, 1918–*October* 15, 1918.

Total rejections.......................... 467,694

Absolute figures and per cent of rejections for (*a*) mental deficiency, (*b*) nervous and mental disorders.

Totals	Per cent	Local boards	Per cent	Camp surgeons	Per cent	Army	Per cent
(*a*) 24,514	5.24	14,417	5.65	6,293	3.66	3,804	9.42
(*b*) 23,728	5.07	10,945	4.29	7,319	4.26	5,464	13.53
Total 48,242	10.31	24,362	9.94	13,612	7.92	9,268	22.95

2d Report of the Provost Marshal General, Table No. 60, p. 166.

Table X.—*Defects Due to Nervous and Mental Diseases Found and Percentage of Men Accepted and Rejected, Covering Approximately the First Million Men Sent to Camp in the Period from June,* 1917, *to May,* 1918 (33).

	Total found	*Accepted*	*Rejected*
Mental deficiency	2,431	98	2,333
Nervous and mental diseases	5,298	251	5,047

TABLE XI.—*Incidences of Various Nervous and Mental Defects among the First 13,481 Recommendations for Discharge Based on Such Defects* (34).

	No.	*Per cent*
Mental defects	4,737	35.1
Epilepsy	1,729	12.8
Psychoneuroses	1,542	11.4
Constitutional psychopathic state	1,239	9.2
Dementia praecox	800	5.9
Alcoholism	759	5.6
Manic-depressive	257	1.9
General paresis	237	1.8
	11,300	83.7

"83.7 per cent of total, representing class of cases which is apt at some time to require custodial care."

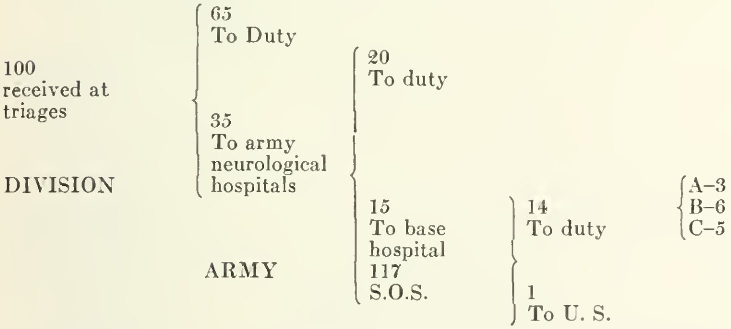
TABLE XII.—*Data Used for Estimating Number of Cases Rejected from First Draft on Account of Nervous and Mental Defects.*

Total number of cases for rejection considered......... 10,258

Causes of rejection	*Number*	*Per cent of total*
Mentally deficient	465	4.53
Nervous disorder	387	3.77
	852	8.30

Total number rejections by local boards............... 730,756
Approximate calculation at 8 per cent................. 58,000 plus

TABLE XIII.—*Outcome of Concussion and Nervous Cases Arising in Battle, September 12 to November 11, 1918 (Percentages)* (37).



A–Front Duty. B–Temporary Base Duty. C–Permanent Base Duty.

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AUTHOR'S NOTE: It is desired to express here appreciation of the great personal interest and help given in the preparation of this paper by Dr. Frank P. Norbury, Springfield, Ill., late Acting Director of the National Committee of Mental Hygiene during the War Emergency.

* * *

OBSERVATIONS ON COMPOUND FRACTURES, INCLUDING A STUDY OF ONE HUNDRED AND EIGHTEEN CASES TREATED BY BONE GRAFT

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THROUGHOUT the war, few problems, either of an administrative or surgical nature, confronted medical officers, that were more difficult of solution than those concerning the collection, transportation and surgical treatment of cases with compound fractures.

That the surgical problem is still with us, can be seen in any of the army general hospitals today where some thousands of these cases are still under treatment.

Not only do these cases furnish a large proportion of those requiring general hospital treatment (at this hospital of 3,256 battle casualties—exclusive of gassed—about 2,000 had compound fracture) but they furnish a very great proportion of those whose disabilities are permanent.

This paper is based on the observation of many hundreds of these cases for a period of a year and a half and as the writer examines every patient discharged from this hospital with a disability of a surgical nature he has inevitably reached some general conclusions as to end results.

In many respects, the "battle" fracture differs so much from the compound comminuted fracture as ordinarily seen, as to deserve a distinctive name. Infection is practically always present and is severe and persistent. Comminution and fissured fractures are most extensive; complications from injuries to nerves, muscles and blood vessels are frequent; delayed or non-union is a common occurrence; refracture is not at all rare; and limitation of motion often persists in the neighboring joints even when they have not been involved in the fracture or infection. Certain complications, such as fibrosis of joints due to prolonged immobilization, arise, due to the fact that these patients frequently are treated primarily with a view to their transportation rather than to the end result to be expected in the individual case.

The fractures now under observation in the army hospitals are of course those which were originally of the worst type, the simpler ones having been healed and the patients discharged or returned to duty; but it is with fractures of this type or their sequelae that the medical profession as a whole will have to deal for years to come, as these soldiers are discharged from the army hospitals and seek the advice of their home doctors.

Nature of the infection: One of the outstanding features of these cases is the persistence of the infection and the suppuration. At the time of the injury infectious material is scattered deeply through the tissues and the organisms spread rapidly. Some of the British surgeons have been able to demonstrate that bacteria can pass, by lateral growth, through several centimeters of dense bone within sixty hours. This extension is aided by the numerous fissured fractures. It is not always possible to remove all of the infected tissue at the primary or subsequent excisions of the wound and the suppuration often continues even after all foreign bodies and sequestrae are removed and bone tunnels eradicated.

In the chronic stage of the infection there is in a majority of the cases, little apparent evidence of absorption from the wound and probably little effort for the production of anti-bodies in the bloodstream. At the writer's request, some work was done in the laboratory of the Walter Reed Hospital, to try to determine by agglutination tests, the resistance of the patient to his own infection. No conclusive results were obtained. Autogenous vaccines were also tried but without appreciable effect on the suppuration.

Exact information as to the infecting organism is not available from all cases but from the data on hand the order of frequency in which the various bacteria occur is about as follows: Staphylococci, streptococci, gram negative bacilli, gram positive bacilli, diplococci. This is in no sense an index of the original infecting organisms, as in many cases the original organism may have died out and been replaced by others.

Interesting observations were made in two cases where apparently quiescent infections with hemolytic streptococci were lighted up by infections in another part of the body with the same organism. Both patients had infection of the tarsus with a small sinus over the oscalcis discharging a very small quantity of thin pus containing haemolytic streptococci. Both patients contracted streptococcus sore throat and in each case the foot became inflamed and the discharge from the old sinus became bloody, in one of the cases the discharge amounting to real hemorrhage.

Another interesting phenomenon is the development of an erysipeloid dermatitis at some distance from the wound. This is usually referred to as erysipelas and it has been customary to isolate and handle these cases like erysipelas. The writer believes that this is a septic thrombosis of superficial vessels. Many such cases have been observed and in practically all of them the condition has arisen in the lower extremity and always distal to the wound. There is marked local and constitutional reaction. The local condition is the picture of erysipelas but usually clears up within three or four days. The patient appears quite sick and the temperature may reach 105 degrees but no fatal case has been seen and usually in about a week the patient is as well as ever. On theoretical grounds, as an autovaccination, the inflammation might be considered an advantage to the patient but no marked improvement in the old wound seems to result. This inflammation or thrombosis sometimes follows an operation on the fractured bone and has also been observed in some cases following a brisk massage where the old wound was entirely healed.

After healing of the wound the infection may remain latent in the bone for many months but is less likely to remain in the soft parts. We seldom see suppuration following secondary operations on the nerves, but after bone-grafting operations, performed long after healing has taken place, suppuration is frequent. In almost every case this suppuration is limited to the originally injured bone and does not involve the bone from which the graft was taken, which excludes the probability of infection at the time of operation.

It is the rule in this hospital at the time of any bone-grafting operation to remove fragments of the fractured bone for culture, and positive results are obtained in a fairly high percentage of cases.

In a typical case recently operated upon by the writer for ununited fracture of the humerus, the wounds had been healed since May 1, 1919. Operation was performed in March, 1920; fragments removed at operation gave pure culture of hemolytic streptococcus. Two days after operation the patient had a temperature of 105 degrees and two days later pus was being discharged from the wound.

The tetanus bacillus may also remain for months quiescent in the bone, though but one case of this disease has occurred among the hundreds operated upon at this hospital. In this case the wound of the tibia was received in June, 1918. Four operations had been performed for osteomyelitis, at each of which it is supposed that antitetanic serum had been given. All wounds were healed by September 1, 1919. Operation (sliding graft of tibia) was performed March 1, 1920. No antitetanic serum given. Tetanus developed March 7 and death occurred March 9.

Treatment of the infection: This is principally a matter of operative surgery—thorough excision of diseased tissue, removal of foreign bodies and sequestrae and eradication of bone tunnels so that the bone defects can be filled with the soft parts. To follow the operative treatment, nothing has been seen which can equal Dakin solution used with the Carrel technique. The great drawback to this method is that the technique is too elaborate. To give good results it must be used exactly as its originator directed, and few men can use it for any length of time without developing their own modifications and slighting the details. Even with this procedure carefully followed out, and with no X-ray or other evidence of sequestrae, foreign bodies or necrosis, sinuses may persist. It is easy to say "There is always an irritant at the bottom of a sinus," and many writers advise operation in these cases; however, with a sinus present, firm union may take place and function be restored and it does not seem wise to jeopardize these by extensive exploration of the bone. A better rule in such cases would be not to operate without a known objective.

Where there is evidence of toxemia or systemic infection, repeated transfusion of blood is of great benefit. A transfusion is especially indicated as a preliminary to operation on a toxic patient.

Amputation: Since the introduction of the newer methods of antiseptic treatment of war wounds and the bridging of bone defects by grafting, the swing of the surgical pendulum has been away from amputation, and in the writer's opinion it has been performed too seldom. Amputation may have to be performed to remove an otherwise uncontrollable infection, and in order that it may be truly a "life-saving measure" it must be done before the infection has produced permanent changes in the internal organs. Occasionally it should be done to remove a hopelessly deformed limb and in this case also the operation should be performed as early as possible. In the military service these patients as a rule are in the beginning of the most productive period of their lives, and a year or more spent in the treatment of an osteomyelitis is a big price to pay for a limb which will never function normally.

The cases in which amputation most often should be considered are those with fracture and osteomyelitis below the middle third of the leg. If there is much loss of substance of the tibia, and especially if the spongy bone of the tarsus is involved, healing is apt to be very slow and to result in fibrosis of the ankle, shortening of the leg and distortion of the weight-bearing line. In examining men for discharge, the writer is constantly impressed with the fact that men with this deformity are more handicapped than those with below-the-knee amputations.

The following case (one of several seen recently) is cited as typical of those requiring amputation. The patient was 29 years old, was married, and owned a farm. He had been in hospitals nearly a year. There was osteomyelitis of the lower one-third of the tibia with a two-inch gap in the bone and fibrosis of the ankle joint. The patient was informed that it would be several months before the wound would be healed, three months after healing before a bone-grafting operation could be done, and probably a year before the bone would be strong enough for full weight bearing, and that the ankle would then be stiff. He requested amputation, which was done, and six weeks later he was walking on an artificial foot and had gone home on a visit.

The same argument applies, but to a less extent, to fracture of the lower end of the femur with infection in the cancellous bone of the condyles and fibrosis of the knee joint.

In the upper extremity any part that can be made to function should be saved.

Nonunion: This occurs quite frequently after war wounds of bone. Exact figures cannot yet be given, but of about two thousand cases which have been treated at this hospital for compound fracture over one hundred and fifty cases of nonunion have already been observed. A small number with ununited fracture who have been discharged at their own request without operation are not included, and of those still under treatment for osteomyelitis there will no doubt be some who will have nonunion.

It seems fairly well accepted now that the use of an autogenous graft or some form of stepping operation are the operations of choice to produce union. The debated question is when to perform the operation. Having decided, from the nature of the injury, the amount of bone defect, and the history of the case, that union is not likely to take place, how soon after healing of the wounds is it safe to operate without undue risk of stirring up a latent infection? It seemed likely that the risk of suppuration following operation would depend directly upon the length of time the original wound had been actively infected and inversely upon the interval which had elasped since the healing.

To throw some light on this subject the histories of one hundred and eighteen cases treated at this hospital have been studied, and the results of the study are tabulated below. In this study it seemed reasonable to assume that where suppuration followed operation the infection was latent in the bone and was not introduced at the time of operation. The operations were performed by the staff of this hospital, all the operators were getting clean results in other cases (including operations on simple ununited fractures), and the bones from which the grafts were removed were not infected. (A few cases in which the dates and results were not given with sufficient accuracy are not included.) The cases were classified first according to the number of months which elapsed between the healing of the original wound and the bone-grafting operation to show the percentage of cases in each class in which there was suppuration after the operation.

Table I

Interval between healing of wounds and bone grafting operation—months	Number of cases	Suppurated after operation	Per cent
1	7	5	70
2	13	4	32
3	13	9	72
4	20	10	50
5	14	6	42
6	14	5	35
7	11	8	72
8	6	1	17
9	5	2	40
10	5	3	60
11	3	1	33
12	3	1	33
13	4	3	75
	118	58	

These cases are of course too few in number to be the basis for definite conclusions, but if any reliance can be placed on the figures in Table I, the risk of suppuration is not minimized by delaying the operation. It would seem to be a question of the reaction of the patient to his own infection. If the infection does become latent in the bone, it is as likely to remain so thirteen months as one.

The cases were then classified according to the number of months the original wound had suppurated.

Table II

Interval between injury and healing—months	Number cases	Suppurated after bone graft operation	Per cent
1	11	3	27
2	8	4	50
3	17	8	48
4	20	9	45
5	16	8	50
6	19	13	65
7	2	1	50
8	8	2	25
9	4	2	50
10	7	4	56
11	1	0	0
12	2	1	50
13	1	1	100
14	1	1	100
15	1	1	100
	118	58	

In this table there seems to be some relationship between the duration of the original infection and the percentage of cases which suppurated after operation. Taking the total number of cases, the percentage in which there has been some suppuration after the bone-grafting operation is very high but the encouraging fact is that in a surprisingly great number of the suppurative cases, the graft was successful. Considering only the cases in which a sufficient length of time has elapsed since the bone-grafting operation for the results to be evident, in 62 per cent of forty-six cases which suppurated after operation the graft was successful. In one case of nonunion, following simple fracture, a graft had been introduced, there was no infection, the graft had absorbed and nonunion persisted. A second bone graft was intorduced and at this operation the wound became infected and suppuration continued for five months, but during that time the graft lived and firm union took place.

As a working proposition one may say that it is reasonably safe to operate in the fourth month after healing; if the original infection persisted for two months or more, suppuration is to be expected in about 50 per cent of the cases; in over one-half of the suppurative cases the graft will be successful; good results may be expected in about 75 per cent of the total cases.

If suppuration does occur following a bone-grafting operation, intensive treatment with Dakin solution should be started at once. In this way the infection is usually quickly controlled and the soft parts close in over the bone. If an inlay graft has been used, held in place by catgut or kangaroo tendon, there is danger of the suture material being dissolved by the Dakin solution, and the bone must be perfectly immobilized to prevent displacement of the graft. For this reason a few pegs or screws of bone, in addition to kangaroo tendon to fasten in the graft, are an advantage.

In certain cases it seems good practice to do the operation in two stages. Where there is a large adherent scar this should be excised and a pedicle graft of soft parts taken from the body or other limb. Later the operation on the bone can be performed through healthy skin. Where the X-ray shows foreign bodies, possible sequestra or necrosis, a preliminary operation should be performed to remove these bodies and clear the ends of the bones. Particles of bone removed at this operation can be cultured and should the wound be sterile the final operation can be performed as soon as healing takes place.

The following table shows one hundred and fifty cases of nonunion, grouped according to the bone involved:

TABLE III

Bone involved	Radius	Tibia	Ulna	Humerus	Fibula	Femur	Metacarpal
Number of cases......	35	38	34	22	7	10	4

Refracture: As this occurs quite frequently, a supporting apparatus must be worn much longer after union than is the rule with simple fractures. In fracture of the femur, a walking caliper with ischial weight bearing should be worn for several months and until the X-ray shows a strong union. After fracture of the tibia with loss of bone substance a double bow leg brace with partial weight bearing at the tibial tuberosities should be used. In these cases there is frequently outward bowing of the tibia long after union has taken place and to prevent this a leather cuff is attached to the inner bar of the brace and encircles the leg at the level of the fracture.

The regretable sequel to battle fractures is the frequent—almost invariable—limitation of motion of neighboring joints due to fibrous changes. So far the fibrosis has shown little response to treatment, either surgical or mechanical, or to physio therapy.

The great advance in treatment will come with a practicable method of fixing the fractured bone during the prolonged healing without including the neighboring joints in the immobilization.

SOME OF THE NEWER WORK ON NEPHRITIS[1]

COMPILED BY MAJOR E. D. KREMERS
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IN PRESENTING the following work on nephritis, the author has found it necessary to bring together some of the important features of the study of nephritis as it has gone on in the past few years and to prepare for the work which is now coming into the literature in large amount. This has formed the basis of the instruction given the medical officers at a general hospital in this subject and it has been accepted by them so kindly and with so much appreciation of what the author has tried to do that it is brought forward here with the same purpose, that of lightening the work of other officers looking for information along the same lines. It is necessary to have this information to be able to understand the modern thought on this important disease and the medical officers of the army should be prepared to at least follow the medicine which is new. It is true that one gets much more benefit from working out this literature for himself but it is probable that unless one is forced in some way to do it, it will not be done because the average medical officer is so far behind. This must also be true of the average physician who has left the Army and is in civil practice. This may, then, supply a need which exists for the average doctor.

In preparing the compilation, I have drawn most upon the following sources:

Dr. L. F. Barker, Address at West Virginia State Medical Association July 11, 1912; Dr. J. L. Miller, Billings-Forcheimer's Therapeusis of Medicine; Dr. J. H. Austin, Progressive Medicine.

PATHOLOGY

The older classification of kidney disease was into acute nephritis and chronic nephritis. The latter was subdivided into parenchymatous (large white kidney or later small white kidney) and interstitial (contracted or granular kidney). It was supposed that in the interstitial variety the lesions were confined largely to the blood vessels and connective tissues and in the parenchymatous to the glomeruli and tubules. Pathologists have shown that it was never possible to make a hard and fast rule in this regard because it is rare to find a kidney in which the change has been confined to one or the other part and there could be shown both parenchymatous and interstitial changes.

A better classification of nephritis pathologically is believed to be into diffuse nephritis and focal nephritis. In the former, the lesions affect the whole organ or the greater part of it and are more serious because of the large amount of kidney tissue damaged and the consequent interference with excretion. The diffuse lesions are like the old parenchymatous. There is one variety of diffuse lesions which may not be so severe. These are not true inflammations but are toxic degenerations which have been shown to affect particularly the epithelium of the tubules. If the toxic action has not been so serious as to entirely destroy the tubules, the epithelium may be regenerated and the case go on to recovery. An example of this action would be a mild mercury poisoning, in which there had not been enough mercury to be excreted to entirely destroy the tubules; and the case would recover. These mild forms of diffuse nephropathy are called degenerative nephritis or nephrosis.

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The focal variety is that in which only portions of the kidney tissue are affected. These may show very little signs or symptoms in the acute stage, and when the chronic stage is reached there will be relatively large areas of kidney substance intact which can carry on the work of the organ. The old chronic interstitial cases may be due to such focal disseminated lesions. The variety of chronic interstitial, as it used to be called, or the hypertension type or cardiorenal disease is essentially a diffuse process affecting the smaller blood vessels of the kidney with sclerosis and a gradually increasing contraction of glomeruli leading to increase of pressure in the vascular system. This is called the genuine contracted kidney.

Recently it has been found possible to produce in animals an experimental nephritis by feeding experiments and it has been found that certain poisons have a selective action on certain parts of the secreting structures. For instance, it can be shown that phosphorus affects almost entirely the tubules while arsenic affects chiefly the glomeruli. This has led clinicians to attempt to make a classification into glomerular nephritis and tubular nephritis. It is difficult to make this classification because it is hard to differentiate between glomerular and tubal lesions in the specimen histologically and also because even if the early change has been entirely tubal, if the tubules are destroyed, the connective tissue will grow and will constrict the tubular space, and this will secondarily cause atrophy of the glomeruli which would secrete through those tubules if they were intact. It is very important, however, to appreciate the selective action of toxic agents so that an attempt may be made to find the etiology of a particular case and to form a picture of the lesions which may be expected to be found in the subject at autopsy.

Experimentally different types of nephritis have been produced. Tubular lesions can be produced by epithelium poisons—uranium nitrate, the chromates, corrosive sublimate and phosphorus. Clinically tubular lesions are also found in the pregnancy kidney, the cholera kidney and the yellow fever kidney and that of other acute infections. Glomerular lesions can be produced by vascular poisons—arsenic, cantharides and snake venom. Clinically, glomerular lesions are found chiefly after the action of the toxins of the streptococcus and, therefore, a glomerulonephritis is expected after scarlet fever and tonsillitis, etc. Pneumococcus toxins and diphtheria toxin are believed to produce much the same effect. The diphtheria toxin causes both glomerular and tubular lesions. Nephritis with edema can be produced by uranium nitrate. Very recently one experimenter has shown that he could produce chronic nephritis in rabbits by feeding them a high protein diet such as egg albumin or soy beans and the nephritis he found pathologically to be somewhat like the chronic arterio-sclerotic form in man. He argues that possibly the chronic insidious nephritis of man is due to the necessity of the kidneys to excrete abnormally large quantities of certain products of protein decomposition or of certain products which are unusually irritating to kidney cells.

The old term, Acute Bright's Disease, can now be shown to include a variety of conditions which are really various and, if we desire to attempt precise diagnosis and treatment, it is necessary to try to separate them. This acute kidney disease may be an acute glomerulo-nephritis which is diffuse or an embolic focal process, a pyelitis which is infecting the kidney or an acute tubular degeneration due to some poison.

The old chronic parenchymatous may be a subacute toxic degeneration or a glomerulo-nephritis or a combination.

The old chronic interstitial may be a genuine contracted kidney, a secondarily contracted kidney or a chronic stage of focal nephritis.

The classification given by Barker follows that of Volhard and Fahr and is that which is found in the literature dealing with the newer kidney study. This is according to etiology and pathology.

1. *Renal Diseases Due to Injuries Reaching the Kidneys through the Blood, Hematogenous, Descending.*

A. Diffuse Hematogenous Nephropathy. Due to soluble toxins.

(*a*) Tubular degenerative nephropathies. These are the nephrosen of Volhard and Fahr. There is no elevation of blood-pressure. They may be acute or chronic. Rarely a contracted kidney stage follows. Examples: Sublimate kidney, phosphorous kidney, pregnancy kidney, bichromate kidney, hemoglobinuric kidney, yellow fever kidney, cholera kidney, kidney of other acute infections.

(*b*) Glomerulo-nephritis, inflammatory. Elevation of blood-pressure occurs. They may be acute, subacute or chronic. Generally due to streptococcus toxins. Pneumococcus and diphtheria toxins also cause these.

(1) Stormy type with marked desquamation and proliferation of the epithelium of the capsule.

(2) Mild type with simple enlargement of the glomeruli.

There is generally tubular damage as well as glomerular. In the chronic form this becomes the secondarily contracted kidney with fibrosis or scarring of a large portion of the glomeruli.

(*c*) Arteriolar nephropathy. Chronic. Arteriosclerotic. Due to diffuse sclerosis of all smaller arteries of kidneys and leading to very high blood-pressure. Volhard and Fahr say that most of the glomeruli are not changed. Others say that sclerosis leads to shrinking of glomeruli. May be due to chronic intoxication in diet. Hypertension type or cardiorenal disease.

Another form of arteriosclerotic kidney in which only certain bloodvessels and those large or middle-sized are sclerosed. This leads to Granular Kidney, a focal sclerosis. Generally does not lead to symtoms during life.

B. Focal Hematogenous Nephropathy. Due to bacteriemias.

(*a*) Embolic purulent nephritis from streptococcus or staphylococcus.

(*b*) Embolic hemorrhagic (non-purulent) glomerulo-nephritis due to streptococcus.

This form, known as large red or variegated kidney due to streptococcus viridans and found in endocarditis.

(*c*) Acute interstitial nephritis with lymphocytic exudate found after scarlet fever.

(*d*) Excretory bacterial nephritis. Orth's Nephritis Pappilaris Mycotica in which true coccus casts occur.

2. *Renal Diseases Due to Injuries Reaching the Kidneys through the Urine, Ascending. Urinogenous.*

(*a*) Hydronephrosis. Due to obstruction.

(*b*) Pyelonephrosis.

  (1) Pyogenic.

  (2) Tuberculous.

PHYSIOLOGY

The mechanism of excretion of urine through the kidneys is not understood. The older theory, that of Ludwig, held that the glomerulus and tubule act as a simple filter and that the rates of excretion for salts, urea, etc., depend upon the laws of osmosis. More lately, it has been held, in a modification of Ludwig's theory, that the process is not entirely mechanical but that the cells of the uriniferous tubules are engaged in a certain amount of selective absorption. The osmosis theory has never been able to explain why egg albumin will be excreted by the kidneys when serum albumin, which is so similar, is retained in the blood, or why urea, which is present in the blood is excreted as a waste product, when sugar, which is also in the blood, is not excreted until a certain concentration 3 parts per 1000 is exceeded.

The vital theory of Bowman holds that the cells of the glomerulus and tubule actively secrete through them certain specific substances. Salts and water are supposed to pass through the glomerulus while urea and other things go through the tubule.

There is no known nervous control of secretion and the only way in which secretion can be modified by nervous influence is through an alteration in the blood supply, perhaps controlled by some nervous influence. The rate of blood flow through the kidney is able to markedly influence the secretion of the urine. When the arterial pressure falls to 40 mm. of mercury, as after shock, or hemorrhage, or cardiac failure, the secretion of urine entirely stops. The action of the caffeine group of diuretics is now believed to be due to a dilation of renal blood vessels and increased flow to the kidney, the pressure not being changed. Digitalis acts as a diuretic by the same sort of vasodilation, even when the heart is normal. (It has recently been shown that digitalis does not raise the blood-pressure and need not be feared in high blood-pressure). The flow of blood through the kidney is very large and very marked change occurs after the action of diuretics.

Normally the urine carries off practically all of the waste nitrogen of the body and this is chiefly in the form of urea. The feces and the sweat carry off only a small amount. The normal daily excretion of nitrogen varies from 14 to 18 grams, representing 88 to 117 grams of proteid. Of the total nitrogen eliminated almost 90 per cent is in the form of urea. The rest is ammonia nitrogen, creatinin nitrogen, uric acid nitrogen and amino nitrogen. The urea is formed from ammonia compounds in the liver. This can be shown experimentally by passing ammonium carbonate through the liver. A very small amount of urea is probably formed outside of the liver and also by the splitting of uric acid. The amount of urea normally excreted daily is about 30 to 34 grams, but this is increased when the individual is on high protein intake. Creatinin is daily excreted in about 1 to 2 grams. This is not altered in amount by change in diet. In febrile conditions or when tissue destruction is increased, the creatinin is increased in excretion. This as well as the purin bodies, uric acid, xanthin, hypoxanthin, adenin, guanin, etc., come almost entirely from proteid destruction and not from their ingestion in the food. The most important salt excretion is that of the chlorides which far exceed the sulphates and phosphates and amount to 10 to 15 grams daily.

The ability to produce experimental nephritis in animals has made it possible to study the altered processes of secretion, etc., in diseased kidneys, and to compare the conditions in glomerular lesions with those of tubal lesions. Some of the things studied have been the causation of edema, high blood-pressure, heart hypertrophy, etc.

Edema in nephritis is not always due to the same cause. It may be due to the severe anemia in the hemorrhagic types or cardiac in the contracted type and only in some of the acute or subacute cases of glomerulonephritis or degenerative nephritis is there true renal edema. The experiments that have been done appear to indicate that edema is due both to a lessened permeability of the renal vessels and to an increased permeability of the peripheral vessels. How these changes are brought about is not known.

The cause of the increased blood-pressure in nephritis is not known. There are several theories which need not be explained. The rise in the pressure may be so rapid as to come on in forty-eight hours after the onset of an acute nephritis. This is too rapid for an explanation on a pathological basis. The great variation of pressure seen in some cases, also suggests a functional basis. The increased pressure is not seen in experimental tubal nephritis, nor in the degenerative nephritis in man which is supposedly tubal largely. It has been established that the removal of a considerable portion of the secreting capacity of the kidney by excision leads to a marked rise in pressure. These findings make it appear that hypertension results in nephritis from glomerular change and the consensus of opinion is also to the effect that the rise in pressure is a compensatory process. It appears to be necessary for the pressure to rise to force the fluids through the kidney.

Martin Fischer's theory of edema has caused much discussion, and although his views are not accepted, they have opened up the subject to a much wider extent and the study of colloid action in the body may lead to improvements in treatment. His theory supposes a primary acidosis of the body tissues, this acid condition giving them an increased affinity for water which is taken up by the colloids of the tissues causing them to swell and hold the fluid. He thinks that salts will decrease the swelling of the colloids which will then let go of the water and the acidosis can be corrected by alkalies which will relieve the condition. His theory is very attractive but is diametrically opposed to the belief of many in the harmful effects of salt retention and the effect of this upon edema.

Heart hypertrophy is common with nephritis and is probably always associated with increased blood-pressure. The enlargement of the heart may be considered dependent on the hypertension and to be associated with those forms of nephritis in which there is glomerular change. In genuine contracted kidney heart hypertrophy may always be expected, while in the contracted form which may follow degenerative or tubal nephritis, increased pressure may not be marked and hypertrophy not follow.

The cause of uremia has not been explained. It must be some form of intoxication but we do not know what the substance is. Uremia does not result after removal of the kidneys. It cannot be produced by the injection of urea or other substances. It has generally been supposed that the intoxication was due to some retained product of metabolism but this has not been discovered. One experimenter has isolated from the blood of uremic persons a crystalline substance with which he could produce uremia in animals but this discovery has not been confirmed, as far as I know. Another has isolated an oil, called urinod, which is supposed to be the cause of the odor of urine. This is very toxic when injected into animals. Whether it is related to uremia is not known. The relation of acidosis in nephritis to uremia is not believed to be important.

BLOOD CHEMISTRY

A great deal of work has been done in recent years on the chemistry of the blood in nephritis and diabetes, the two diseases where it seems to be most important. These controlled results are now used to a great extent in civil clinics and have been used in the Army by the physicians who brought them with them from civil life. The standard tests are included in the Army Manual of Laboratories, and the medical officer, especially the one in the medical wards, must know the principles, at least, of their use. They are concerned in some of the functional tests of the kidney that are used nowadays, and one has to know them in order to interpret the current literature dealing with metabolic conditions. The tests are not so difficult as we have been lead to believe. They require a good laboratory and a good technician but are no more difficult, if they are as difficult, as the Wassermann test. The blood samples are taken from the vein in the same way that the Wassermann samples are taken and the patient is very little discommoded. These blood tests are especially important in the study of the retention of different substances, dependent on faulty excretion.

In studying retention, we should understand what is meant when we read or hear of the "threshold phenomenon" or a raising or lowering of the threshold. This is particularly used in diabetes but also in nephritis where the question of excretion or retention comes in. In the case of sugar, for example, sugar is normally present in the blood but does not appear in the urine until a certain concentration is exceeded. The normal maximum point is considered the threshold. Normally albumin is not excreted at all. Here perhaps it is not easy to speak of a normal threshold. Urea, uric acid, and certain salts can also be said to have a threshold which is normal and below which such substances will not appear in the urine. In certain conditions the threshold level may be raised or lowered. For instance, in diabetes, when sugar appears in the urine, there is a lowered threshold for sugar. When the patient is kept on a diet which renders him sugar-free for a period of time, his tolerance for sugar gradually increases and the threshold is then raised. In nephritis the same phenomenon has been ascribed to the effect of chloride intake in raising or lowering the chloride threshold. In nephritis the chloride threshold is higher than normal and this results in a higher concentration of chlorides in the blood. Nitrogenous products also have an increased concentration in the blood and may be said to have raised threshold.

The whole subject of kidney retention, blood chemistry, etc., is still rather experimental, but this should not keep us from trying to work these important studies into our clinical studies. For the practitioner, perhaps, these elaborate tests are not necessary, but at least in the hospitals they should be used and should be studied along with the cases. The estimation of retention of different kinds forms a large part of certain of the functional tests and it should be understood that the tendency in the study of kidney diseases has verged from a pathological and clinical basis very largely to a functional basis. Cases are now treated for the correction of certain retentions which have been found to be present and the estimation of the retention of certain products has a very wide application to the estimation of the progress or amelioration of the disease and the prognosis that may be given.

The fact of retention, of course, means that there is a defect of excretion and the retention in the blood is caused by a lack of elimination in the urine. The two things go on together. When chlorides pile up in the blood, this means that they do not get away in the urine and likewise, if the chlorides are found to be increased in the blood, it is evidence that there is a defect of elimination which must be looked for in the kidneys. Retention of chlorides in the blood and diminished excretion of chlorides in the urine, may be one of the first signs of kidney disease. Normally the concentration of chlorides in the urine is 1.8 per cent. When the kidney is diseased, it may be unable to concentrate above 0.5 to 0.6 per cent or less. In making this determination, we must be careful to exclude extra-renal factors, such as lobar pneumonia and cardiac edema, in both of which conditions there is a diminished excretion of chlorides. In these two conditions, however, there is no particular retention in the blood.

Nitrogen elimination in the urine will also be diminished in kidney disease, especially in glomerular change, arteriosclerotic kidney and mercury degeneration. This can be determined by estimating the amount of urea excreted, using the ureometer or more refined methods. If desired, urea may be given by mouth in certain amount and the amount excreted estimated after the feeding. The patient should be on a diet which is constant and which will allow of accurate determination.

The normal concentration of chlorides in the blood is found to be from 5.62 to 6.25 grams per liter. In nephritis the concentration is generally found to be higher. It has been found experimentally that an excessive intake of chlorides raises the threshold and that a salt-free diet may lower it. In estimating chloride retention we must exclude a circulatory condition, especially cardiac edema.

The non-protein nitrogen in the blood has been found to be normally 20 to 30 mgms. per 100 c.c. of blood. This will rise after heavy meat or other protein feeding. Of the non-protein nitrogen, the urea nitrogen is about 30 to 50 per cent. This is normally 9 to 25 mg. per 100 c.c. The other fractions are uric acid nitrogen .3 to 1 grams per 100 c.c.; creatin nitrogen, .4 to .5 mg. per 100 c.c.; creatinin nitrogen, 1.6 to 2.7 mg. per 100 c.c.; amino nitrogen and ammonia nitrogen, which are in small amount.

The amount of non-protein nitrogen in the blood rises with impairment of kidney function and may reach 100 to 200 mg. per 100 c.c. of blood. After heavy protein feeding there is an increase but this has been shown to be not over 25 mg. Passive congestion may increase it but not to such high values. The chief part of the increase is due to the urea nitrogen; this is 70 to 90 per cent. An increase of non-protein nitrogen is called azetomia, the name coming from the urea increase in the blood.

One of the most important things to be determined by an estimation of protein retention is the presence of creatinin in increased amount. Where there is a persistent increase in this part of the nitrogen, death may be expected within a short time. A value over 5 mg. per 100 c.c. of blood has always proved fatal. It may reach 15–30 mg.

An increase in the non-protein nitrogen may point to an imminent uremia, though uremia may come on with a low retention. This also, that is, a persistent increase of non-protein nitrogen has a definite prognostic value.

In nephritis it is not unusual to have an increase in the amount of sugar in the blood. This is known as hyperglycaemia. Where diabetes is associated with nephritis, as it so often is, this determination is especially important. Then the estimation of sugar excretion in the urine is not reliable because of the impaired function of the kidney.

FUNCTIONAL TESTS

Various functional tests for the kidneys have been used for a long time. It is only comparatively recently, however, that they have been simplified and extended so that we may use only a few simple functional tests, those which any practitioner may use, or select certain functional tests to determine certain points in the kidney function that we may wish to examine. The older tests are not much used now. Among those are the cryoscopy test, the determination of the freezing points of liquids applied to the urine; electrical conductivity test for urine; phlorizin, which produces an artificial glycosuria in which some idea of kidney excretion can be determined; the dye tests, using methylene blue, rosanilin and indigo-carmine. These have been surpassed and replaced by the phenolsulphonphthalein test, which is more reliable and simpler. This will be taken up later.

Certain routine tests which are familiar to all are in fact functional tests and still of great value. Many important aspects of kidney function are revealed by simple tests which can be done by any practitioner using careful observation and intelligent interpretation. Such a simple test is the careful estimation of the specific gravity, preferably that of both day and night samples. This, together with the estimation of the quantity excreted during the day twenty-four hours and that of the night twenty-four hours, gives important data. From these two factors the amount of total solids excreted can also be estinnated. The amount of urea excretcd can easily be determined by the use of the ureometer which was once used for the pregnant woman. From the urea, the amount of nitrogen eliminated can be calculated, fifteen grams of urea contains 7 grams of nitrogen.

The phenolsulphonepthalein test is one which can be done by the practitioner and is probably the best and most reliable all around test for kidney excretion. This drug was first prepared by Remsen and was introduced by Abel and Rountree. The dye is furnished in ampules and is given by hypodermic or intravenous injection of a measured quantity, 1 c.c., which represents 6 mg. of the dye. Before the injection, the patient empties his bladder and one-half hour before the injection, he is given two or three glasses of water. At the end of one hour and again at the end of the second hour after injection, the patient voids urine which is carefully saved. The urine is treated with a small amount of 20 per cent NaOH solution which alkalinizes it and causes it to take on a deep red color. The amount of dye in each portion of urine is then estimated by means of a colorimeter or by comparing it with standard solutions. The normal excretion varies from 40 to 60 per cent in the first hour and 20 to 25 per cent in the second hour. Diminished power of the kidneys to excrete is shown by diminished excretion of the drug. This test is also of considerable prognostic value and can be used as a guide to the progress of the cases for better or for worse. There is no condition of the kidneys in which there is increased permeability to the drug.

One of the simplest functional tests is the Water Test. One may give a measured amount of water and then measure the amount excreted. If much less is excreted than would normally be passed, this indicates diminished excretion.

Two other water tests are useful in estimating the amount of damage in contracted kidneys. The first stage of fixation of specific gravity is shown by a loss of the power to concentrate the urine. Normally, when the patient is placed on a very dry diet for twenty-four hours, the specific gravity should rise to 1,030 to 1,040. It may be found that when the patient is on this very dry diet that, instead of a high specific gravity, the urine shows a gravity of 1,011 to 1,013. This is spoken of as the first stage of fixation of specific gravity or hyposthenuria. The kidneys have lost their power to excrete a concentrated urine. They may retain their power to dilute the urine. This may be determined by giving a dilution test of a large amount of water. Normally, the specific gravity should fall to 1,003 to 1,005. It may be found that the specific gravity, after giving a large amount of water remains at about 1,011 to 1,013. This indicates the second stage of fixation of specific gravity or hyposthenuria, and shows that the kidneys have lost their power to dilute the urine. In this condition the specific gravity of the urine remains practically the same throughout the 24 hours.

An easy method of determining hyposthenuria is to collect the urine regularly at two hour intervals from 9.00 a. m. to 9.00 p. m. and another specimen or two from 9.00 p. m. to 9.00 a. m. The specific gravity of each specimen should then be taken as well as the amount for each specimen. When more than 400 c.c. of urine is passed during the twenty-four hours of the night, that is presumptive evidence of a certain amount of hyposthenuria and may be taken to indicate contracted kidney. If the quantities of the two hourly day specimens are approximately equal that is more evidence of hyposthenuria. In carrying out these simple tests, it must be remembered that we must exclude extra-renal conditions which might give similar pictures. These might be: pyelitis, cystitis, hypertrophied prostate, pyelonephritis, severe anemia, polycystic kidney and diabetes insipidus. We should also be careful to know the intake of fluid during the testing period, so that we can exclude temporary variations in fluid output.

Mosenthal has devised a test-meal with which accurate deductions can be made as to kidney excretion. The purpose and the value of the meal is that the patient is on a diet which insures a known quantity intake and output. It will be included because of its thoroughness. All food is to be salt-free. Salt for each meal is furnished in weighed quantity. (One capsule of salt, containing 2.3 gm. of sodium chloride is furnished for each meal. The salt which is not consumed is returned to the laboratory, where it is weighed, and the actual amount of salt taken is calculated.) All food or liquid not taken must be weighed or measured after meals and charted in a standard diet card. No food or fluid of any kind is allowed between meals.

Breakfast: 8 a. m.	*Dinner: 12 noon.*	*Supper: 5 p. m.*
Boiled oatmeal, 100 grams.	Meat soup, 180 c.c.	Eggs, two, any style.
Sugar, 1 to 2 teaspoonfuls.	Beefsteak, 100 grams.	Bread, 2 slices, 30 grams each.
Milk, 30 c.c.	Potato, baked, mashed or boiled.	Butter, 20 grams.
Bread, two slices, 30 grams each.	Green vegetables, as desired.	Tea, 180 c.c. Sugar, 1 teasp. Milk, 20 c.c. } 200 c.c.
Butter, 20 grams.	Bread, two slices, 30 grams each.	Fruit, stewed, fresh, 1 portion.
Coffee, 160 c.c. Sugar, 1 teasp. Milk, 40 c.c. } 200 c.c.	Butter, 20 grams.	Water, 300 c.c.
Milk, 200 c.c.	Tea, 180 c.c. Sugar, 1 teasp. Milk, 20 c.c. } 200 c.c.	
Water, 200 c.c.	Water, 250 c.c.	
	Pudding, tapioca or rice. 110 grams.	

No food or fluid is to be taken during the night. The patient is to empty the bladder at 8.00 a.m. and at each period as indicated: 8 a.m., 10 a.m., 12 m., 2 p.m., 4 p.m., 6 p.m., 8 p.m., then again at 8 a.m.

The above dietary contains approximately 13.4 grams of nitrogen, 8.5 grams of salt, 1,760 c.c. of fluid, and a considerable quantity of purin material in the meat, soup, tea and coffee. All of those purins act as diuretics. Mosenthal thinks the procedure can be carried out in households if careful instructions and supervision are observed. Normal individuals should show the following characteristics of the urine:

1. Variations in the specific gravity of the urine specimens (usually 10 points or more).

2. The balance between the daily output and intake of salt, nitrogen and fluid. This should be approximately equal.

3. A night urine high in specific gravity (at least 1,016 but usually 1,018 or higher), high in its percentage of nitrogen (above 1 per cent), and small in amount (400 c.c. or less) regardless of the quantity of fluid ingested or the amount of urine voided during the day.

Usually the patient is kept on this diet for three days in order to insure proper results. Tests could be carried out during each of three days or on only one.

When the kidney function is impaired, the following results may follow the test-diet.

1. Nocturnal polyuria. (Over 400 c.c.)
2. Tendency to total polyuria. (The volume of urine equals or surpasses the quantity of liquids ingested.)
3. Fixation of specific gravity, gradually becoming more intense as the case progresses, until it is absolute and the specimens only show a maximum variation of 1 or 2 degrees. In the earlier stages, specific gravity may be fixed at a higher level than later.
4. Fixation of the two-hourly quantity of urine eliminated. The usual polyuria response to meals is absent.
5. The quantity of night urine may diminish to within normal limits. Such night urines, however, are characterized by a low specific gravity and a low percentage of nitrogen.
6. A retention of both salt and nitrogen which may be very marked.

In studying the excretion of nitrogen, Ambard determined that the rate of urea excretion depends upon the concentration of urea in the blood and the rate of water excretion and that a constant formula could be used to give constant results in different persons and in the same person at different times. This formula is known as Ambard's coefficient and is largely used as one of the modern functional tests for kidney function. His formula was modified by McLean in order to simplify it. McLean's modification is as follows:

$$\frac{U}{\frac{\sqrt{D}}{Wt} \times \sqrt{C}} = K$$

In the above formula, U represents grams of urea in the blood; D represents the grams of urea excreted in twenty-four hours; $Wt.$ represents the body-weight in kilos; C represents the grams of urea per liter of urine during seventy-two minutes. K is the constant, or Ambard's coefficient. In carrying out the test, the urine is collected for seventy-two minutes, representing 1/20 of twenty-four hours. At the middle point of the seventy-two minutes, a blood-sample is drawn to determine the urea in the blood. When there is impaired kidney function, there is an increase in the value of K.

McLean has further modified Ambard's coefficient so as to change the formula to what is known as McLean's Index. It represents the same value expressed in a simpler and different way. His formula is as follows:

$$\frac{D\sqrt{C} \times 8.96}{Wt. \times U^2} = Index$$

In this index the characters have the same values as in the first formula. When there is impairment of kidney function, the value of the index falls.

SELECTION OF FUNCTIONAL TESTS

In considering the functional tests that are at our disposal and in determining the tests that we will use, we must remember that they are not all for the same purpose and that for a certain part of the desired knowledge one test will be best or easiest while for another part of the data, another test will be more satisfactory. The test which is used more than any other is the phenolsulphonephthalein test. This is reliable and simple and there is no known condition which gives increased permeability to the drug. It is necessary to be careful to eliminate urinary obstruction below the bladder for when this is present there is decreased elimination. This is a test which any general practitioner can use without difficulty.

The test diet with estimation of the volume at different periods, the day and night urine, the specific gravity and chloride output is a very complete and satisfactory test, particularly in the contracted kidney variety. Blood examination for the determination of uric acid, urea, creatinin, sugar, nonprotein nitrogen and urea nitrogen is simpler than the test diet but requires a better laboratory. It is less annoying to the patient especially if he is able to get around about his business. The withdrawal of the blood takes only a few minutes and the rest of the work is done in the laboratory. It is not influenced by vomiting, refusal of food, diarrhea, delirium or coma. The carbon-dioxide combining power of the blood is generally determined with the blood chemistry in order to have an estimation of the degree, if any, of acidosis present. A retention of uric acid in the blood is one of the first things that can be found to denote impaired kidney function. The blood creatinin is the best guide to prognosis as to severity. Where the creatinin is over 5 mm. per 100 c.c. of blood, there has invariably been a fatal end within a short time. The value may rise as high as 15 to 30. In nephritis with diabetes, the blood is the only reliable guide to sugar excretion as the kidney function is impaired.

For following the result of treatment or for estimating the progress or improvement of a case, the sulphonephthalein test, Ambard's coefficient and the amount of the blood urea are probably the best tests.

If we are doubtful or skeptical or disinclined to use the modern and rather difficult tests, there are a few simple ones which must never be neglected. These, as given by Barker, are the sulphonephthalein or "red" test and the determination of the volume and specific gravity of the urine to determine hyposthenuria or fixation of specific gravity. The "red" test is especially useful to determine whether a patient is able to undergo an operation from the standpoint of his renal function.

SYMPTOMS

There are certain very important symptoms in nephritis which we should understand.

Albuminuria: This also appears in various inflammations of the lower urinary passages, the pelvis of the kidney, ureter, bladder or urethra. Leucorrhea or menstrual blood in women will also produce it. Other cellular elements than blood and pus-cells such as spermatozoa in the male or bacteria in the urine will give a trace of albumin. These must be carefully excluded by the use of the microscope. It is important also to remember that albuminuria may appear in innocent conditions. The orthostatic or postural albuminuria can be excluded by testing the patient, generally a child, by standing against a wall for ten minutes and then collecting a sample. The urine of such a patient, after standing, may show albumin where the night urine is free. We must also remember the albuminuria which accompanies the passive congestion of heart disease.

Casts.—At one time a great deal of stress was laid upon the varieties of casts found in the urine in nephritis. The variety is not now thought to be particularly diagnostic in nephritis of various kinds. There are two notable exceptions. The finding of blood casts are diagnostic of acute glomerulo-nephritis and coccus casts are found only in the excretory nephritis of Orth.

Changes in quantity of the urine: These are important. An oliguria, *i. e.*, a diminished quantity of urine with albumin and casts and especially with blood is common in glomerulo-nephritis. An oliguria with casts and albumin may also be found with a failing heart. Polyuria, *i.e.*, the passage of an increased quantity of urine is a prominent sign of contracted kidney. It is also found in diabetes insipidus, pyelitis, amyloid disease of the kidney and polycystic kidney. Temporary polyurias do not point to kidney disease.

Night Urination: This symptom, or as it is generally called, nycturia, is almost invariably found in contracted kidney and may be one of the first things noted. It is necessary to question patients as to whether they arise at night to urinate and how often.

Hyposthenuria: This term is used to denote the passage of low specific gravity and especially in cases where the kidneys have lost their power to change the specific gravity of the urine and is useful in studying contracted kidney. It is also known as "fixation of the specific gravity." It has been more completely described under the functional tests.

Hematuria: With blood casts, hematuria points directly to glomerular disease. The affection may be focal or diffuse. The term Hematuria is meant here to include only true renal hematuria, of course. There may be various other causes for the bleeding.

Edema: This may be noted as the first symptom or sign of nephritis. It is often noticed first in the lower eyelids and later in the skin of the feet and ankles. The collection of fluid in the abdomen, ascites, and in the pleural cavity, hydrothorax, is essentially the same.

Hypertension: High pressure with hypertrophy of the left ventricle is an important sign of nephritis and points especially to contracted kidney. An arteriosclerosis of the small arteries of the kidneys may then be expected. There may be only slight albumin, few casts and no other important signs except that the urine is of low specific gravity. In these cases, the first symptoms complained of are apt to be those of tension, headache, dizziness, dyspnea, fatigability, irritability. High pressure is also found in the diffuse glomerular nephritis and in some tubular degenerations which are extensive. It appears to be due to glomerular damage and interference with kidney excretion.

Uremia: The symptoms of uremia may be the first ones noted. These are headache, dizziness, vomiting, convulsions, diarrhea, renal asthma, somnolence and coma.

Disturbances of Vision: Failing vision may be the first complaint and examination may show retinitis. Examination of the fundus is important as a prognostic sign in every case of nephritis.

There are a few terms used in the literature which may not have been brought out and which it is important to know.

Azotemia: An increase in the quantity of urea in the blood.

Azoturia: An increase of urea in the urine. The administration of urea and its determination in the urine has been used as a functional test.

Acidosis: A reduction of the normal alkalinity of the blood and tissues.

Benign Sclerosis or Hyperpiesis: That form of kidney disease caused by sclerosis of the small arterioles of the kidneys shown by very high blood-pressure and possibly by very few other signs. This is found in the early stage of the disease. Later heart hypertrophy develops.

CLINICAL CLASSIFICATION AND TREATMENT

Janeway has given a classification of nephritis which is most useful. It is such a classification as can be used as a guide to the management of the case and to the prognosis. This is as follows:

1. Patients in whom albumin and casts in the urine are the only evidence of disease. (*a*) Instances of a healing acute lesion. (*b*) Instances of postural albuminuria. (*c*) The remaining cases.

Evidence of healing may be found in the history of recent mild infection, tonsillitis, pregnancy, syphilis, some intoxication or the administration of salvarsan. In such cases, rest in bed on a milk or other bland diet may clear up the condition. If a week in bed on such a diet does not cause improvement, such rigid treatment is probably useless and search should be made for a focus of infection or toxaemia.

Postural or orthostatic albuminuria may be determined by testing the urine at different times of the day, or by causing the patient to stand for 15 to 30 minutes in a markedly lordotic position. In such albuminuria it has been noted that there is a larger amount of proteid precipitable by acetic acid in the cold. Casts may also be present. The treatment should be gymnastic exercises to correct the faulty posture with general tonic invigoration. The diet should be simple but not too restricted. The phtalein test will probably be normal.

The third sub-group includes a large number of conditions. We should look for stone, new growth, focal infection in the tonsils, teeth, seminal vesicles, prostate, a toxic cause such as arsenic or other inorganic poison, intestinal fermentation or catarrh. If no cause is found, the case should be kept under observation and functional tests should be carried out. Until these tests show impaired function specific treatment is not indicated except to safeguard the kidneys against unnecessary strain.

Avoid: Excessive physical strain; exposure to cold and wet; alcohol or excessive tobacco; condiments, pepper, mustard and spices; foods, rich in creatinin and poor in nutritive value, such as meatstock soups and broths; the use of salt, except in extreme moderation.

II. Patients with hypertension, with or without a trace of albumin and with slight subjective symptoms or none at all.

These are commonly classed as vascular or sclerotic hypertension or cardiovascular hypertensive disease. (Benign sclerosis or hyperpiesis.)

A safeguarding treatment is sufficient. It includes:

The avoidance of emotional or mental strain causes of pressure rise.

The securing of adequate sleep, and preferably a mid-day rest; moderation in the use of tobacco, watching the effect on the blood-pressure.

The avoidance of excessive physical exercise. Exercise should be employed but not to the point of fatigue or anginoid pain. When exercise cannot be taken, massage is helpful.

Limitation of diet, including condiments, meat-extractives and last, with particular emphasis on not overeating. Meat need not be excluded from the diet. Winter residence away from high cold winds if it can be afforded. A long vacation once or twice a year is also helpful.

Sweat baths or Turkish baths if well borne.

Reduction of blood-pressure to be attempted only with extreme caution.

III. Patients with hypertension and outspoken myocardial insufficiency. These require all those general rules of Group II, and, in addition, symptomatic treatment for dyspnea, edema and chronic passive congestion of the viscera. Some of the cases have anginoid pain or severe angina on exertion. Physical exertion must be very mild. To ward off anginal attacks, nitroglycerin tablets may be carried and dissolved on the tongue. Theobromine may be useful.

During heart failure, rest in bed is necessary, or if orthopnoeic, in a chair. If auricular fibrillation comes on, digitalis effect should be secured. Digitalis will also help the edema and dyspnea if carefully given. The diet must be carefully regulated. The output of salt, nitrogen and fluid must be carefully worked out on a known intake. The Mosenthal test-meal will be most helpful and the phtalein test will aid. The blood urea and Ambard's Coefficient will be of great help to determine the nitrogen retention. If nitrogen retention is found, protein intake must be strictly limited. A good low protein diet is that of Mosenthal.

Breakfast

Sherry 30 c.c.

Baked apple, stewed prunes or orange.

Hominy corn starch cereal (⅔ hominy: ⅓ corn starch, cream 15 c.c.)

Supper

Same as dinner. Sugar and butter may be taken as desired and need not be weighed.

Dinner

Sherry 30 c.c.

Potato baked, mashed,

String beans, carrots, lettuce, onions, tomatoes or cucumber pickles.

Fruit, cornstarch pudding or fruit tapioca pudding.

The salt intake, if salt is retained, should be cut to a point below the twenty-four hour output. Where there is much edema, salt-free or salt-poor diet should be given. The Karell diet is ideal in these cases. This consists of 800 c.c. of milk as the only food or fluid allowed. When diuresis becomes abundant, the milk may be increased to 1,500 c.c. All such patients must continue to take very little salt and not to take fluid or food in large quantities.

During a condition of improvement, return to activity must be very gradual and must be carefully supervised. Safeguarding treatment must be rigid.

IV. Patients with general edema without myocardial insufficiency, the prominent symptom. Albumin in large amount and containing casts.

This is the group called degenerative nephritis of nephrosis. It is not large. The blood-pressure is generally not raised. Autopsy may show amyloid disease. The functions of salt and water elimination are particularly disturbed. The phtalein test and tests for nitrogen retention may be normal.

The diet should be one of low salt and water intake to encourage elimination of water. If the edema disappears, water intake may be increased up to the point of output. Later the salt intake may be increased up to the point of excretion. Bed is desirable until function is restored. The further treatment is as in Group I. When the edema does not diminish on the above treatment sweating must be used.

V. Advanced renal insufficiency with uremia.

All the evidences of impaired kidney function are shown. The test diet would be too extreme for such a case. Water elimination may remain normal and no edema may develop. Treatment is symptomatic. For the dyspnea, the patient may be kept in a chair. Sodium nitrite at bed-time with chloral or bromides or together may induce sleep. There is apt to be acidosis and alkalies may be tried. Morphine may be given but may lead to anuria and coma and must, therefore, be given carefully. The diet should be practically protein free with a large amount of carbohydrates. An occasional nitrogen starvation day has proved useful to Janeway. Water should be given liberally if the excretion will care for it.

When uremia is present, measures to eliminate the poisons must be used. Bleeding is very useful if there is not too much anemia. It is particularly useful when there are convulsions. At least 500 to 600 c.c. of blood should be removed in such cases. Sweating may also be useful. It is very important to treat the myocardial condition which is present. An attempt should be made to prevent or improve passive congestion.

If there is an obstruction to urinary flow, this should be removed. An enlarged prostate, pyelitis or pyelonephritis may rapidly lead to severe kidney damage. Decapsulation of the kidneys may be indicated, especially for the severe edema or acute anuria or oliguria cases. Such an operation may do much to prolong life.

OPERATION OF THE MEDICAL DIVISION OF THE AIR SERVICE SINCE THE SIGNING OF THE ARMISTICE[1]

By Colonel ALBERT E. TRUBY[2] and Major JOHN DIBBLE
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WHEN the distinguished president of this Association asked us to present a paper at this meeting it was decided that the subject which would probably be of most interest to former Air Service Medical officers would be a brief review of the work which has been accomplished by the Medical Division since they left the service. We recall the great interest and enthusiasm shown at the Flight Surgeons' meeting at Dallas, Texas, 13 months ago. At that time most of the Flight Surgeons were about ready to return to civil life, and it is believed that all of you still maintain great interest in the service. Since that meeting war activities have been closed. The great war army has been demobilized, and the formation of a new peace time army, with its more deliberate and systematic procedures, has begun. In all this the Medical Division of the Air Service has played an active part.

Shortly after the armistice was signed the Air Service was reörganized, and a new director was appointed. One of his first steps was to request the Surgeon General to transfer the Air Service Division of the Surgeon General's Office to the Air Service. This request was approved, and the Medical Division of the Air Service was organized. A chief surgeon was appointed by Air Service orders, and he was placed in charge of the Medical Division. The necessity for this separate Medical Division for the Air Service was therefore recognized, and its usefulness has since that time been thoroughly demonstrated. We still receive inquiries as to why the Air Service should have a special Medical Division any more than other branches, such as the infantry, cavalry, and artillery. We have been able to satisfy those concerned, however, by calling attention to the splendid work which has made the Flight Surgeon indispensable at flying fields, by the especial work done at the Medical Research Laboratory at Mineola, and by the requirements of the highly technical physical examination for flying.

Personnel naturally demanded a great deal of attention in the process of demobilization and reörganization. At the time of maximum activity there were 70 active air service stations in the United States, all under the control of the director of Air Service, which required for their medical care 971 medical officers, 453 female nurses, and 3,752 enlisted men. This personnel was practically all serving for the emergency only, and the reports of the signing of the armistice were scarcely dry from the presses before the Chief Surgeon's Office was bombarded with requests and demands for immediate release from the service. When practicable "such immediate discharge was granted those who applied for it. Others of the personnel expressed a willingness to remain in the service as long as they were needed, and those, with a few regulars and those of the temporary personnel who desired permanent commissions in the Army, continued the work of the Medical Division. As stations were closed the available medical personnel was transferred to active stations, and by this arrangement all who desired prompt discharge were gradually separated from the service. This applied especially to officers and nurses. Enlisted men in all instances were not so fortunate, but all applications for discharge were given due consideration and men were released as rapidly as their services could be spared. Urgent requests for discharge were always given prompt consideration. As air service stations continued to be closed, or became inactive, medical personnel was redistributed, some of it being released to the Office of the Surgeon General when it was not required by the Air Service."

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[1] Read at the annual meeting of the Air Service Medical Association of the United States at New Orleans, La., April 26, 1920.

[2] Chief Surgeon, Air Service.

As reörganization of the Regular Army progressed it soon became apparent that the Air Service would particularly appeal to applicants for enlistment, and it has, therefore, been possible to maintain the Air Service at its full authorized strength of approximately 10,000 officers and men. These are now scattered among the 33 active and 11 inactive stations of the Air Service. Medical care is furnished to all of these stations by 98 officers, 38 nurses, and 422 enlisted men of the Medical Department. A recent order has placed the active flying fields under the control of the Department Commanders. While this has taken the medical personnel at these stations from our control to a certain extent, it has in no way interfered with the special work which this office is carrying on. Department Commanders and Department Surgeons have been informed of the special functions of the Flight Surgeon, and it has been arranged that they shall not be diverted from their special duties with Air Service troops. The Flight Surgeon is recognized as a highly specialized medical officer, and a very necessary adjunct to every military flying field. It has been one of the big problems of this office to supply medical officers with proper qualifications for this work. There were very few permanent officers of the Medical Corps attached to the Air Service prior to the signing of the armistice, and of the emergency men who served as Flight Surgeons during this time, practically all desired to return to their civilian work. This made it necessary to obtain permanent officers for this duty, and for this reason the following circular letter from the Surgeon General's Office was published:

WAR DEPARTMENT
OFFICE OF THE SURGEON GENERAL

WASHINGTON, *April* 25, 1919.

Circular Letter No. 189:
Subject: *Flight Surgeons for the Air Service.*

1. Owing to the discharge of a large number of temporary medical officers, the Air Service needs a number of medical officers of the permanent establishment for the position of Flight Surgeon.

2. This position is one of recent development. The medical officers who have served as Flight Surgeons have been particularly active and efficient, so much so, that the importance of their work has been recognized by the Air Service authorities, including the commanding officers of the flying fields. The Air Service now requires that a Flight Surgeon be detailed for duty at all of its active fields.

3. The duties of a Flight Surgeon are essentially as follows:

He has full charge of everything connected with the physical condition and care of the flier. The Flight Surgeon lives with and associates with the aviators constantly. In this way he is able to determine when any individual is not in proper condition to fly. In order to do this, he must be able, through tact and general efficiency, to gain the confidence of the fliers. For the same reason it has been demonstrated that the Flight Surgeon should take flying training and actually become a licensed pilot. Authority has been granted medical officers to take such training, and when they qualify they are entitled to all the rights and privileges of aviators, including the "wings" and the 25 per cent increase in pay from the time training is started. Medical officers who have been Flight Surgeons are enthusiastic over this work. They have undoubtedly saved many lives and much property.

4. Medical officers below the grade of Lieutenant Colonel who desire duty as outlined above should communicate with the Chief Surgeon, Air Service, Washington, D. C. Vacancies will be filled from among those who volunteer in this way.

By direction of the Surgeon General:

C. R. DARNALL, *Col., M. C., U. S. A.,*
Executive Officer.

As a result of this letter approximately 30 men applied for detail as Flight Surgeon, 10 of whom were rejected physically because of the high standard required for flying (609 examination). In addition 20 temporary officers who desired permanent commissions made similar applications. This assured a sufficient supply of Flight Surgeons for present needs. In order to standardize the work in this special field the accepted applicants were ordered to the Medical Research Laboratory, Hazelhurst Field, in groups of five to fifteen for a special course of instruction.

This course of instruction required a period of two months for its completion and was thoroughly systematized so that the time could be put to the greatest advantage to fit the students for their new work. Classes were held daily from 9 a. m. to 5 p. m., except Sundays. Systematic lectures were given by representatives of all departments of the laboratory staff and their lectures were supplemented by practical work whenever possible. Abundant clinical material was available among the fliers returning from overseas and who were being discharged at

Mitchel Field in large numbers; in the wards of the Camp Mills Hospital; and at the various hospitals for the insane about New York. No attempt was made to give a complete course in all of the specialties represented at the laboratory, the object being simply to give the future Flight Surgeons a firm practical foundation for their future work in selecting, classifying, and caring for the fliers. Rigid examinations were given in each subject at the end of the course and those who passed them satisfactorily were given a certificate and ordered to the various flying fields for duty. The scope of the Flight Surgeon's work has greatly increased due to the conditions imposed by a peace status. There are no longer any Aviation Physical Examining Boards, Physical Directors, or specially organized Rebreather Units and all the work formerly performed by these special groups is now thrown on the shoulders of the Flight Surgeon. The importance of the Flight Surgeon's work and the recognition which the Flight Surgeon has received can best be shown by the following circular, which was issued by the Director of Air Service:

WAR DEPARTMENT

OFFICE OF THE DIRECTOR OF AIR SERVICE

WASHINGTON, *October* 15, 1919.

Circular No. 123:

1. Commanding Officers of Air Service stations where flying is being carried on will consult with the Flight Surgeon in all matters pertaining to the mental and physical fitness of the flying personnel of his command. The term "flying personnel" will include all who make aerial flights, such as instructors, flying officers and individuals undergoing instruction.

2. Commanding Officers will take full advantage of the assistance that can be rendered by the Flight Surgeon and the Physical Director of his Field. Such matters as the amonnt and kind of physical exercise required by individuals engaged in flying; the state of fatigue of the individual flyer; the amount of sleep necessary; food problems; reëxaminations and all field conditions affecting the welfare of the flying personnel will be made the subject of conferences between the Commanding Officer and the Flight Surgeon or Physical Director. Commanding Officers should obtain the recommendation of the Flight Surgeon on application for leaves or furlough from any one engaged in flying when physical incapacity is made the basis of the application.

3. The Flight Surgeon will be listed on any form for clearance in vogue at an Air Service station, and no flying officer or any one undergoing flying instruction will be transferred from a station without first obtaining a clearance from that officer. Upon notification of transfer, the Flight Surgeon will forward to the Flight Surgeon of the new station the reëxamination report and laboratory rating chart of the individual being transferred. This will be in addition to Form 609, Record of Examination required to be forwarded to the Flight Surgeon of the new station, by Par. 4, Orders No. 31, O. D. A. S., 1919.

4. Flight Surgeons will be encouraged in every way to take flying instruction. Upon completion of the prescribed test, Flight Surgeons will be rated in the same manner as other flying officers. Applications for flying training should be made

through the Surgeon to the station commander and will be accompanied by the necessary report of physical examination.

5. Upon recommendation of the Surgeon, station commanders will authorize medical officers of the command, who are physically qualified and make application, to take flying instruction. This will enable one of these officers to take the place of the Flight Surgeon when the latter for any reason is not available for that duty.

6. Unless an absolute necessity exists therefor, Flight Surgeons and Physical Directors will not be diverted from their regular duty to perform routine post administrative duties when this service can be performed by another medical officer. Flight Surgeons and Physical Directors should devote all the time possible to the close and constant supervision over flying personnel, as indicated in Par. 2.

7. The Flight Surgeon and the Physical Director of an Air Service station will not be detailed as a member of a board of officers convened to examine into the efficiency of a flying officer when it can be avoided. Their services will be of more value when called before a Board as an expert witness, to give testimony relative to physical fitness, etc., of the officer under investigation.

By direction of the Director of Air Service:

Wm. F. Pearson, *Colonel, A. S. A.,*
Administrative Executive.

As stated above, the Air Service particularly appealed to applicants for enlistment in the army, one reason for this being the policy adopted by the Air Service of selecting cadets for training as pilots from among these enlisted men. All enlisted men are eligible for this training, provided they can pass the preliminary examinations which consist of a mental examination and a physical examination on Form 609, given by a board of officers, one of whom is the flight surgeon, who makes the physical examination. He thus assumes the function of the Aviation Physical Examination Board.

The men who successfully pass these examinations are assigned to either Carlstrom or March Fields, which are designated as Air Service Pilot Schools, and which are now the only stations at which pilot instruction is given. It thus happens that at these fields only does the flight surgeon have cadets to care for. If the cadet completes his course at these schools satisfactorily he is commissioned as a second lieutenant, Air Service, Officers' Reserve Corps, inactive, and is then discharged or allowed to continue on duty as an enlisted man of the Air Service, as he may desire.

It is believed that the system outlined above will not yield a sufficient number of men suitable for cadet instruction, and to make up this deficiency arrangements are being made to select a proportion of cadets direct from civil life. The preliminary examinations for these men will be the same as that of the enlisted men outlined above and will require a flight surgeon to make the physical examination.

As a result of the experience gained in examining approximately 25,000 men for flying training during the war, a careful analysis of the causes of disqualifications, the experience gained by observing fliers at the fields and the researches made at the Medical Research Laboratory at Mineola, New York, it became evident that some changes in the physical requirements for flying were necessary. These changes, principally in the examination of the eyes and nervous system, were incorporated in a new edition of Form 609, A. G. O., Physical Examination for Fliers, which is now in use. Special instructions for making this examination were also issued as Special Regulations 65-c, W. D.

The development of satisfactory apparatus for testing depth perception at 6 meters has led to the adoption of this in place of the old hand stereoscope, which was quite artificial and very generally a puzzle to the candidates. This test was developed at the Medical Research Laboratory at Mineola. The machine is very simple in construction and operation, and has proved quite satisfactory in practical use. Sufficient work has now been done with it to establish reliable standards for interpreting the results of the tests.

Practical work with aviators on the flying fields and at the front has led to unanimity of opinion among all workers in aviation medicine, both in this country and abroad, that normal action of the extrinsic muscles of the eyes is absolutely essential to safe flying. As a result, the tests of these muscles have been greatly amplified by the addition of tests for muscle balance at 33 cm., power of prism divergence, and tangent curtain diagnosis. Other important modifications of the eye tests have been made in the testing of each eye separately for color vision, perimetry for both form and color and a complete refraction. The last is most important for the detection of latent hyperopia, which condition, by reason of its tendency to become manifest under the fatigue and stress of flying, has proven disastrous in many instances.

The numerous cases of "staleness," neuresthenia, neuro-circulatory asthenia, and psychoses generally, as well as simple loss of confidence among fliers, has indicated the necessity for a more careful selection of these men as regards their nervous stability. In order that the inferior along these lines might be eliminated the examination of the nervous system was made to include a detailed personality study in addition to the usual tests for organic nervous disorders.

The instructions for making this examination, as published in Special Regulations 65-c, are minutely detailed so that the examination can be standardized wherever given. In addition a provision has been placed in these instructions that only medical officers designated in writing by the Surgeon General are authorized to make this examination. Such authority has only been given to graduates of the Medical Research Laboratory who have had instruction in the standard methods of performing the examination. The inevitable personal element which enters into all examinations has by this means been still further diminished. There are at present 40 officers on active duty who have been so designated, 21 being permanent officers of the Army. Of these, 29 are now on flying status, 7 being rated as pilots; 3 are receiving pilot instruction officially, while 2 more are awaiting assignment to a pilot school for training.

And thus the flight surgeon plays his part in selecting the flier, which naturally leads us to his main function, that of caring for the flier.

There is little new to be said on this subject. His duties here remain practically the same as during the war. Naturally they have been somewhat enlarged as without an athletic director or nutrition officer, the flight surgeon is expected to see that their functions are still carried on.

One important detail in the care of the flier consists of a careful checking up of the physical condition of every pilot. Early in 1919 the Chief Surgeon's Office discovered the fact that a few officers had ceived flying training and become pilots who had never taken the prescribed physical examination, on Form 609, for flying. This led to an investigation, which showed that there was no record of physical examination for flying for a great number of the officers who had received ratings as pilots. It was also discovered that a few officers who had been physically disqualified for flying by the War Department, continued flying training and were acting as pilots, in spite of the fact that they were physically disqualified. The discovery of these conditions led this office to the recommendation of orders which would place the subject of physical examinations for flying on a systematic basis. Orders No. 45 and 52 were, therefore, issued by the Director of Air Service. From these orders, supplemented by Special Regulations 65-c, prepared in the Chief Surgeon's Office and issued by the War Department, it will be seen that every flier must be physically reëxamined in January and July of each year. This is a full physical examination, reported on Form 609, the use of the shorter Form 694 having been discontinued. The orders quoted will be appended to this article so that those of you who are interested may be able to study them.

By these reëxaminations, disqualifying conditions are detected in their incipiency and proper corrective measures instituted, thus conserving the flying personnel. Whenever disqualifying defects are found on these reëxaminations the case is referred to a board of officers, composed of the Chief Surgeon and Chiefs of Air Service, groups in the office of the Director of Air Service. If the pilot's record is such as to indicate that he has attained a degree of skill in flying which is apt to compensate for his defects, and the latter are slight, a waiver is recommended and usually granted. No waivers are granted for defects found at original examinations of candidates for flying training. Flight surgeons are not authorized to waive any defects, and this office refers all requests for waiver, with proper recommendations, to the Surgeon General of the Army.

With the present strength of the air service it is possible to check both original examinations and reëxaminations of all fliers in the office of the Chief Surgeon. It is therefore provided that Form 609 in every case be made in triplicate, one copy to remain permanently at the station where the examination is made, one to accompany the flier wherever he goes for duty and one copy for file in the central files of the office of the Director of Air Service. Two copies are sent in to the Chief Surgeon as soon as made and these are reviewed and the flier certified as qualified or disqualified for flying. One of these is the director's file copy and the other is returned to the flier's station as the copy for the flight surgeon's file.

In the case of an original examination the candidate is not authorized to proceed with flying training until this certified report of examination has been received at his station, and in the case of disqualification on reëxamination an order is issued by the Director of Air Service which relieves the flier from further duty as a pilot until his defect has been remedied.

A card index file has been prepared in the office of the Chief Surgeon with a card for every flier and on this card is noted the result of every physical examination with its date, the date of all crashes, the classification of the flier on the rebreather, and other important data. By these cards it is possible to make a quick check and see that all required examinations have been made and also to determine exactly the physical fitness for flying of each flier up to the time of his examination.

Classification of the flier by rebreather examination was discontined, except at the Medical Research Laboratory at Mitchel Field, for a considerable period while demobilization was going on. This was necessary because of the discharge of personnel and the uncertainty as to the future status of the various air service stations.

With the adoption of a permanent training policy, however, it was possible to take this work up again and branch laboratories have been set up at Kelly Field and at the pilot schools, Carlstrom and March Fields. This work at Kelly Field has made fair progress but at the other stations has been delayed due to lack of personnel. Enlisted men are being trained at the laboratory at Mitchel Field to operate the machines and personnel will shortly be available for this work. The great difficulty encountered so far has been that with the one year enlistment period the men have been nearly ready for discharge by the time they have shown their fitness for such special training and too late to receive the necessary instruction. So far very few of them have shown any inclination to reënlist.

It is planned to classify every cadet passing through the pilot schools according to his rebreather run. The classes at these schools will average about 150 men and it is planned to complete the training of each class in about four months, so that to make the "runs" as planned it will be necessary to take two men every day for five days a week throughout the courses. With the limited personnel available for the work it will be seen that such a plan is quite ambitious.

In addition to classifying the cadets it is hoped that in time every officer already in the service will be similarly tested. The records made during the war have all been reviewed and it has been found that only about 20 per cent of the present officer personnel has had the rebreather test. The remainder will be tested as opportunity presents itself. For this purpose a unit will be established at the Army Medical School at Washington and this, together with the other four units at Mitchel, Kelly, Carlstrom, and March Fields, should in a reasonable time catch all men not already tested.

This covers the work of selecting, classifying, and caring for the fliers as individuals. But the function of the Medical Division of the Air Service does not stop here. There are many problems affecting fliers in general to be solved and these can only be solved by statistical studies of the fliers en masse. For such study it is necessary that certain facts regarding all fliers be collected in one place, the office of the Chief Surgeon, and there consolidated and analyzed. The basis of these studies is found in the weekly "Care of the Flier" report, the "Crash Report" and the "Statistical Report of Fliers." The first two of these are old reports which have been greatly revised and enlarged. The last is a new report and will bring together data relating to the fliers which is at present unobtainable at any central point, but which will be of inestimable value in solving problems which are now subject merely to speculation. Thus we must ascertain the age limits which shall be fixed for cadets; we must determine the average period of usefulness as a pilot; whether intensity of flying training shortens such usefulness and why the pilot wears out when he does. What types of planes are most dangerous, and what particular type of injury, if any, is more common with any particular type of plane? These and many other problems of a similar nature have been presented for solution, not by theory but by demonstrable facts.

This statistical work is as yet in an embryonic stage. The work has been fairly well outlined but not enough material is as yet available to furnish much basis for reliable conclusions. The data obtained as a result of the Transcontinental Race has been carefully reviewed and made the basis of a full report to the Director of Air Service. This report has led to comments which make it seem probable that such undertakings will not be made in future without consultation with the office of the Chief Surgeon, and subject to some medical supervision. In addition to this a complete statistical analysis of 1,250 crashes reported between May 1, 1918, and December 31, 1919, is about completed.

Research work in aviation medicine has been pushed with undiminished vigor by those officers still on duty at the Medical Research Laboratory. Numerous original articles have been contributed to the medical literature of this country and in addition there will be ready for issue shortly an "Air Service Medical Bulletin" containing fourteen original articles contributed by the laboratory staff. A delay of almost a year in the publishing of these articles has resulted because of the fact that the Senate Committee on Printing failed to authorize funds for this work. Other issues will probably follow as the progress of the work warrants.

The great general interest taken in aviation medicine is indicated by the frequent editorials on the subject appearing in the various medical journals, together with numerous abstracts of articles published in this country and abroad. A library of all this work is being collected in the office of the chief surgeon and additions to it will be welcomely received As articles appear in domestic and foreign journals requests are made direct to the authors to furnish copies of their reprints to this library and as a return courtesy it is planned to give the new "Bulletin" rather wide distribution. It is hoped that this manifestation of interest in their work on our part will lead many authors to voluntarily forward such contributions as they may have.

The work required of the air service in patrolling the Mexican border and the general realization of the value of commercial aviation has resulted in a great increase in the amount of cross-country flying. This work is especially hazardous and has resulted in many crashes at remote points which has served to create new interest in the possibilities of the aeroplane ambulance. None of the types developed during the war were quite satisfactory and the engineering division has undertaken to design a fuselage especially suited to this work. Plans of all the ambulance planes already in use were submitted to the engineering division with the following remarks:

> There should be room for two passengers besides the pilot. The ideal arrangement, from the medical standpoint, would be a place for two Stokes navy litters.

Arrangements should be made for a medical officer to ride out to the scene of accident in the plane with the pilot, occupying the space for one of the patients. If there are two patients, both patients can be placed in the litters and brought back. If one patient, he can be placed in one litter and the medical officer can accompany him back. If practicable, a detachable seat, which can be folded up out of the way when not in use, should be available for the medical officer. Construction should be so arranged that it is possible for two men to load and unload the litters. It is immaterial, from the medical point of view, whether the patients are in front or behind the pilot. Litters should be installed so that the patient's head be slightly elevated. In the ordinary type of plane it is believed this would be more readily obtained if the patient rides feet first if he is located in front of the pilot, and head first if he is located in the rear of the pilot. If such a plane is not considered practical, then similar arrangements should be made making provision for but one patient. Provision should be made so that the medical officer can ride out to the scene of the accident with the pilot and attend to the patient. The medical officer, after loading the patient, can remain at the field until another plane picks him up.

Satisfactory progress is being made in this work and a number of these ships should shortly be in commission for work on the Mexican border.

The Ruggles orientator is likewise receiving its full share of attention with a view to determining its actual value in training aviators to overcome the effects of vertigo. Machines have been installed at the pilot training schools and a certain number of cadets designated to receive instruction and practice with them. The work is regularly planned, beginning with a short seance, using only one control and gradually increasing as experience is gained. So far this work has been very promising, the majority of the men being able to compensate for any vertigo they may have after about six lessons, totaling twenty-five minutes of actual work in the orientator.

In carrying out the work outlined above it is most gratifying to be able to state that the Medical Division has had the active support and coöperation of all departments of the air service, as well as that of the Surgeon General's office. We are doing our very best under the limitations of peace-time conditions to carry on the great work that was so well started by the members of this association and other medical officers connected with the Air Service. You will, I am sure, be pleased to know that we have prepared a list of all medical officers who served with the Air Service during the war, and that the Surgeon General has authorized the reservation of this officer personnel for duty with the Air Service in case of future emergencies requiring their service, provided that they belong to the Reserve Corps or volunteer for service.

It is our sincere hope that you will continue to keep up an active interest in the medical aspects of aviation, and that you will lend us your invaluable advice and support.

WAR DEPARTMENT

OFFICE OF THE DIRECTOR OF AIR SERVICE,

WASHINGTON, *September* 29, 1919.

Orders No. 45:

1. Orders No. 31, O.D.A.S., July 24, 1919, are rescinded and the following substituted therefor.

2. All applicants for heavier or lighter-than-air flying training will be subjected to a rigid physical examination before being authorized to proceed with such training. These examinations will be made only by such medical officers as are authorized in writing by the Surgeon General of the Army to conduct such examinations and will be conducted as prescribed in existing orders.

3. A record of the examination, in triplicate, will be made on Form 609, A.G.O. Two copies will be forwarded to this office direct, attention Chief Surgeon, Air Service, and the third copy retained by the Flight Surgeon at the station of the candidate. Upon receipt of the two copies of Form 609 at this office, they will be approved or disapproved by the Chief Surgeon, Air Service, and one copy returned to the station from which received and one copy retained in this office for permanent file.

4. Upon receipt back at the station of the copy of Form 609, the action of this office contained thereon will be transcribed to the retained copy of the form and the same certified as a "true copy"; candidates will not be allowed to proceed with their flying training until an approved copy of Form 609 in their case has been received back at the station.

5. Whenever an individual is transferred to another station, the copy of Form 609, with the action of this office certified thereon, as provided in Par. 3 above, will be forwarded to the Flight Surgeon of the new station. The other copy of Form 609 will be retained at the station for permanent file.

6. Commanding Officers of Air Service stations will require the Flight Surgeon or Post Surgeon in the absence of the former, to investigate the physical examination records of all commissioned and enlisted personnel engaged in flying or under flying instruction.

7. A report of this investigation covering the flying personnel, as of November 1, 1919, for all personnel for whom reports have not been submitted under the provisions of Par. 6, Orders No. 31, O.D.A.S. (rescinded by this order) giving name, rank and organization and whether qualified or disqualified for flying status, as shown by the record on Form 609, will be forwarded through the Commanding Officer to this office, attention Chief Surgeon, Air Service. If the record on Form 609 is not found, or is incomplete in any case, these facts will also be reported.

8. In cases where the physical examination record is incomplete, unsatisfactory or missing, the Commanding Officer will immediately direct discontinuance in flying until the physical qualifications have been properly determined, recorded and certified, as required by this Order. This restriction will not apply to officers who have already received either the Reserve Military Aviator, Junior Military Aviator, Military Aviator, Observer, Reserve Military Aeronaut, Junior Military Aeronaut or Military Aeronaut ratings.

9. Officers making physical examinations will under no circumstances waive physical defects.

10. Re-examinations will be required from time to time, as deemed expedient by this office, or as considered necessary by Commanding Officers, to determine the physical fitness of any one to continue on flying training or duty. Commanding

Officers are authorized, upon recommendation of the Flight Surgeon, to suspend the flying training of, or to relieve from flying duty, any individual considered physically incapacitated, and to authorize the resumption of such training when the individual is found physically fit. Whenever such incapacity is not the result of a disability incurred as a result of participation in aerial flights, the individual will be relieved from flying status until the disability is removed.

11. No rating as Reserve Military Aviator, Junior Military Aviator, Military Aviator, Observer, Reserve Military Aeronaut, Junior Military Aeronaut, or Military Aeronaut will be given until the Report of the Board of Officers received at this office has been furnished the Chief Surgeon, and same has been received back from the Chief Surgeon with a statement to the effect that the candidate is considered physically qualified for the rating recommended. A copy of the statement will be filed with the report of the Board of officers on the candidate under consideration.

12. Attention is invited to the provisions of G. O. No. 63, W. D., 1914, G. O. No. 13, W. D., 1917, Special Regulations No. 50, W. D. (Aviation Section, Signal Corps), and Circular No. 49, O. D. A. S., 1919, which should be studied in connection with this Order in so far as the physical examination of applicants for flying training is concerned.

By direction of the Director of Air Service:

Wm. F. Pearson, *Colonel, A. S. A.*,
Administrative Executive.

War Department
OFFICE OF THE DIRECTOR OF AIR SERVICE
Washington, *December* 1, 1919.

Orders No. 52:

1. The last sentence, paragraph 8, Orders No. 45, O. D. A. S., September 30, 1919, is rescinded.

2. All officers and enlisted men on flying status, including observers, "heavier or lighter than air" service, will be subjected to a physical reëxamination on Form 609 in January and July of each year. These examinations will be made only by such medical officers as are authorized in writing by the Surgeon General of the Army to make physical examinations for flying training, and will be conducted and recorded as prescribed in Orders No. 45, O.D.A.S., September 30, 1919.

3. In cases where a 609 physical examination has been made since July 1, 1919, in compliance with Orders No. 31 or 45, O.D.A.S., 1919, a reëxamination will not be required in January, 1920.

4. When the Medical Division of this office reports either an applicant for flying training or a flier as physically disqualified, the Personnel Division will issue an order definitely fixing the status of each individual case.

5. All persons on a flying status prior to rating as Reserve Military Aviator, Junior Military Aviator, etc., will be reëxamined physically by a properly authorized medical officer, and a report submitted to this office on Form 609 as a part of the proceedings of the Examining Board.

6. A list of stations having medical officers authorized to conduct this examination will be furnished all commanding officers. At stations or places where the examination cannot be made, the commanding officer will communicate with the Director of Air Service, giving names of officers and enlisted men who require examination under the provisions of this order.

7. Nothing in the provisions of this order will be construed to restrict commanding officers from removing a flier from flying duty whenever the physical condition

of a flier warrants such action. Commanding officers are authorized to direct such other physical examinations from time to time as they may deem necessary. Whenever a flier has been removed from flying duty under the conditions mentioned in this paragraph, he will not be allowed to resume such duty until the Flight Surgeon, or the Post Surgeon in the absence of the Flight Surgeon, certifies that he is physically fit for flying duty.

8. The physical examination required for ratings of aviation and balloon mechanicians, by Paragraph 310, Compilation of Orders, as amended by Changes No. 19, September 20, 1919, is not as complete a physical examination as is prescribed for fliers. No mechanician will, therefore, be allowed to take flying training or to pilot an airship until he has been found physically qualified by the prescribed physical examination for fliers (Form 609).

9. When officers or enlisted men, including those who are physically disqualified as pilots, are required to participate in frequent and regular aerial flights in the performance of duties other than those of pilots, the provisions of Paragraph 1269½, Army Regulations, will govern the question of increased compensation. Under no circumstances will they be allowed to take flying training or act as pilots if they are physically disqualified for such duty.

10. Commanding officers of all Air Service stations are charged with the responsibility of enforcing the provisions of this order.

By direction of the Director of Air Service:

Wm. F. Pearson, *Colonel, A.S.A.*,
Administrative Executive.

MALARIA DRAINAGE OPERATIONS AT THE PORT OF EMBARKATION, NEWPORT NEWS, VIRGINIA[1]

By WILLIAM B. HERMS[2]

Associate Professor of Parasitology, University of California

(With one illustration)

TO UNDERSTAND the real menace of malaria to the military camps situated in the vicinity of Newport News, Va., one has but to read the report (unpublished) of a survey of this vicinity made by Dr. H. R. Carter, Assistant Surgeon General of the United States Public Health Service and Dr. T. H. D. Griffitts, U. S. P. H. S., in August, 1917. In this report there are abundant references to the widespread and prolific occurrence of *Anopheles quadrimaculatus*, *Anopheles crucians* and *Anopheles punctipennis* (in order of abundance), and to the prevalence of malaria. In the midst of these malarial conditions were planted Camps Stuart, Hill and Alexander, and in spite of difficult drainage problems it was possible to report in December, 1918, that not a single case of malaria had originated in these camps. The value of this work is emphasized by the following paragraph from a letter from Col. Jere B. Clayton, then Surgeon of the Port of Embarkation, Newport News, Va., to the Surgeon General, U. S. A., dated November 27, 1917: "I regard the proper drainage of these swamps as the most important sanitary work that we have to do in this vicinity, as, if it is not done properly, troops stopping here while waiting overseas transportation during the mosquito season between July and October will unquestionably become infected with malaria in spite of netting and mosquito bars."

Although the United States Public Health Service had contemplated extensive extra-cantonment operations in malarial control at this port, and did considerable ditching in the vicinity of Boat Harbor during the autumn of 1917, the labor problem made extensive operations impossible, owing to the great amount of government work in progress. The local representative, it is understood, was advised to postpone operations until March or April, 1918. However, the same difficulty to secure labor was again encountered, and extra-cantonment work made slow progress. In order to afford protection to troops stationed in the camps and in various parts of Newport News, considerable extra-cantonment work was done by the military authorities during 1918, and assistance was rendered the United States Public Health Service in many ways.

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[1] Published by permission of the Surgeon General, U. S. A.

[2] Discharged major, Sanitary Corps, U. S. A., in charge of malaria drainage operations and chief of Insect Control, Port of Embarkation, Newport News, Va.

Organization.—With instructions to make a survey of drainage conditions at the Port of Embarkation Camps, Newport News, Va., a sanitary corps officer was assigned for duty October 13, 1917, and a second officer December 29, 1917. The survey, owing to unusually severe weather conditions, was delayed until about February 1, 1918, and a report of the findings was submitted to proper authorities in due season.

A company of 200 colored Sanitary Corps troops arrived for duty April 8 and was organized as a Malarial Drainage Detachment attached to the office of the Surgeon, Headquarters, Port of Embarkation. Later 47 colored hospital corps men were added, and temporarily, during the summer months, 50 colored stevedores, making a maximum of about 300 enlisted men, in addition to 12 white hospital corps men who were used as inspectors and noncommissioned officers. Owing to the fact that this organization was broken up into smaller detachments, in addition to the special nature of the work, a larger number than usual of commissioned officers (all white) was needed to carry on the operations. Thus, detachment headquarters were maintained at Camp Stuart in direct command of a captain (Sanitary Corps) assisted by a first lieutenant (Medical Corps) and a second lieutenant (Sanitary Corps), while a smaller detachment was stationed at Camp Hill in command of a captain (Sanitary Corps) and another at Camp Morrison in command of a captain (Medical Corps). Emergency details were stationed at the Nansemond Ordnance Depot, Reservoir Guard near Lee Hall and at the Rifle Range. An officer (captain, Sanitary Corps), under the direction of the Surgeon Port of Embarkation, assisted by a small detachment of men, carried on malarial drainage work at the Army Supply Base at Norfolk.

Uniformity of action and proper coördination of the various detachments was satisfactorily maintained through the office of the surgeon. The detachments at Camps Stuart, Hill and Morrison maintained their own mess and canteens, and a spirit of friendly rivalry in work and sports was promoted which added much to the otherwise dreary, monotonous pick-and-shovel work.

The Drainage Problem.—The drainage problem at once becomes obvious in the light of the following extract from a letter by Col. Charles Lynch, Surgeon, Port of Embarkation, dated March 29, 1918, viz.: "Briefly, the camps constituting this port of embarkation are in swamps, or so near swamps that to all intents and purposes, so far as the mosquito menace is concerned, they might as well be in the swamps. Mosquitoes breed by the million in the swamps in question. These mosquitoes are of the malaria carrying variety. Plenty of people in the vicinity suffer from malaria. . . ." To illustrate the difficulties concretely, the following example will serve the purpose: Newmarket Creek, really only a wooded water-course with a drainage area of 7,000 acres, originates about 6 miles beyond the northern boundary of Camp Alexander and forms a typical fresh water swamp immediately east of Camps Morrison, Alexander and Hill, including several miles of swamp, both northerly and southeasterly from this point. The natural grade near its upper reaches is about 2.3 feet per mile, reducing rapidly to 12 inches per mile, which accounts for the swamp. It is this meager fall that made drainage operations difficult in nearly every part of the lower peninsula.

Camps Hill and Alexander were, furthermore, affected by Beaver Creek swamp, partly tide and partly fresh water, including about 20 acres between the two camps and draining in a southwesterly direction with an outlet in the James River. Drainage of this swamp presented no extraordinary difficulties.

Camp Stuart comprised nearly 300 acres, of which 25 acres consisted of the reservation and the Ivy Avenue swamp in the extreme southwestern corner of the reservation. Ivy Avenue swamp presented no difficult control problem, while Salters Creek Swamp, in addition to being very low (only 0.5 foot above high tide), received a part of the city sewage and discharge from a number of private sewers.

In addition to the drainage and mosquito control work at the camps mentioned, more or less extensive control operations were carried out at the Army Supply Base near Norfolk, the Nansemond Ordnance Depot at Pig Point, the Rifle Range, Lee Hall Reservoir Guard, and much extra-cantonment work in the vicinity of the camps mentioned and in Newport News.

Drainage Operations.—Drainage and grading work within the actual confines of the camps was largely done by contract under the supervision of the construction quartermaster and the government supervising engineer. This work, while fundamental in the building of a camp, may not affect the mosquito question materially, this side of the work being merely incidental as a rule. That much work remained to be done in all of the camps is shown by the various reports submitted to the Surgeon General and the port surgeon.

Ditching by the Sanitary Corps began April 15, 1918, at Camp Stuart, a small amount having been done for about a month prior to this at Camp Hill by details from colored labor battalions. Salters Creek Swamp was systematically ditched so as to concentrate the water and a 36-inch tide gate (Model No. 100 Calco Automatic) put in place at the point where the channel crossed Chestnut Avenue. The Ivy Street marsh was also properly ditched, the outlet into the James River being left open allowing the tides to flood the ditches. Although a tide gate was planned for this point, it was deemed unnecessary after the ditching was completed, and, furthermore, considerable progress was made in filling the marsh with refuse (incinerated as far as possible) from the camps.

At Camp Hill, the Beaver Creek swamp was channelized, dyked and sumped from Virginia Avenue to its outlet in the James. Aside from small local mosquito breeding places dependent on the seasonal rains and careless disposition of water containers, Beaver Creek and Newmarket Creek were responsible for practically the entire mosquito population of Camps Hill and Alexander.

Newmarket Swamp, as already explained, presented a problem of considerable proportion owing to its extent and scant grade. As originally planned, a cut-off ditch was begun under contract about October 1, 1918, extending from the eastern end of Beaver Creek to Newmarket Creek in order to divert the upper waters from the latter to the former and thence into the James River. The length of this cut-off (open ditch canal) to Beaver Creek at Virginia Avenue is about 4,000 feet with a maximum cut of 16 feet, a minimum of 3 feet at the junction with Newmarket Creek, average width at the top about 18 feet, at the bottom about 3 feet with a grade of 1 foot to a thousand, and representing an excavation of about 20,000 cubic yards.

Very slow progress was made on this ditch, with completion April 1, 1919, too late to be of service to the military camps in this vicinity. In the meantime, all of the water from Newmarket Creek was carried through a new canal paralleling the old water course and constructed by the Sanitary Corps from the junction of the cut-off canal to the Sconesdam Road, a distance of 4,000 feet. The original survey called for a ditch following the general course of Newmarket Creek through the swamp. This plan was discarded in favor of a ditch paralleling the swamp on comparatively dry ground and tapping the swamps frequent intervals with laterals. This plan rendered the work much easier and made possible a much better ditch giving just as good results. This new canal, 4,000 feet in length with a maximum cut of 7 feet, a minimum of 2 feet, slide slopes 1 to 1 and a width of about 6 feet at the top represents an excavation of 4,396 cubic yards. The work on this ditch was started September 12 and completed December 1, 1918. Carried under the Sconesdam Road through a culvert, the water pours into a ditch constructed by the United States Public Health Service and thence through an old canal about 1½ miles in length, 10 feet deep and 25 feet wide at the top, built, according to old negroes living in the neighborhood, from fifty to sixty years ago, apparently as part of an old drainage project and then abandoned.

With the completion of work on Newmarket Swamp, which includes considerable channelization north of the above mentioned cut-off by the U. S. P. H. S., many acres of land on both sides have been reclaimed for agricultural purposes and malaria should be very materially reduced.

Camp Morrison, while literally planted in the midst of a swamp, rapidly became a well-drained camp, largely due to effective and extensive drainage operations by the camp personnel. The work of the Malarial Drainage Detachment here was chiefly intensive and against odds, due to the proximity of Newmarket swamp and the malaria-ridden town of Morrison. Soldiers from Morrison not only frequented the village but found rendezvous in and about eating houses for several miles along the Richmond Road toward Lee Hall. In spite of these odds there occurred only ten local malaria infections.

Lee Hall.—In April, 1918, a company of the 48th Infantry, relieved September 5 by Guard and Fire Company No. 327, was stationed about a mile south of the town of Lee Hall to act as a guard for the reservoirs at Lee Hall and at Harwood's Mills. The morbidity rate from malaria among the civil population was estimated by the U. S. P. H. S. at well over 90 per cent in this vicinity for the previous season, and *Anopheles quadrimaculatus* was the predominating and extremely abundant mosquito.

Control work directed against the mosquitoes consisted of temporary canalization of the portion of the swamp adjacent to the camp on the west. This swamp was formed by the back-waters of the Warwick River which originates at this point. At the time of the ditching it was only hoped to concentrate the water, but the operations so changed the ecological conditions that anopheline breeding was entirely inhibited in that portion where the ditching was completed.

Weekly oiling of the pools, water barrels, and other possible sources in the immediate vicinity of the camps failed to eliminate the abundant supply of mosquitoes infesting the camp until it was decided to oil the borders of the cut-off portion of the reservoir located about 400 yards from the camp site. This impounded water had a slight current due to the fact that its overflow was carried away by a culvert located at the end of the pond nearest the camp site. This flow brought down large masses of floatage always heavily infected with larvae and pupa. By oiling the borders of the pond, already covered with floatage, the additional masses that floated down were well covered with oil. The treatment of this source showed an immediate decrease in the number of mosquitoes infesting the camp. The United States Public Health

Service, although operating in this district, was primarily interested in the protection of Camp Eustis and the town of Lee Hall and were not able to do much work in the vicinity of the guard camp. The nature of the work done by the troops at this camp—guard duty among the civil population and at some distance from points where control work was done, rendered them especially liable to infection. Head nets, repellents for the hands and wrists, mosquito bars, and a bi-weekly dose of 30 grains of quinine were additional precautions exercised. In addition, a daily collection of mosquitoes was made in tents and barracks through the camp. The tabulation of these captures is interesting as the records were started at the time when mosquitoes are normally the most abundant in that section.

1918	*Number anophelines taken*	*Average per screened shelter*
Aug. 27–Sept. 2	745	4.1
Sept. 2–Sept. 9	245	1.4
Sept. 11–Sept. 16	60	0.25

Despite these precautions, 25 cases of malaria originated among troops stationed at this camp during the nine months from April to December. These cases totalled more than half the total number occurring on the records of the port.

A comparison of this morbidity rate of 5.3 per cent among these troops as compared with the high rate among the civilian residents (certainly over 90 per cent and actually 100 per cent in 1917 for eight families living within a few yards of the camp)throws a more favorable light on the results of the efforts at this station.

That cases occurred at all is due to the inability to make the order to wear head nets and use of repellents ironclad. Numerous parties were given for the men in the neighborhood, baseball games often continued through the dangerous period of dusk, and men on guard, unless constantly watched and punished, were apt to become lax, particularly when the mosquitoes were not extremely abundant. The quinine treatment, in many cases, masked a latent infection which manifested itself when the dosage was discontinued through the man's transfer to other stations or to the hospital for treatment of disease other than malaria.

Nansemond Ordnance Depot, located at Pig Point opposite Newport News on the James, like the camps already described, was seriously affected by mosquito producing swamps of both salt and fresh water. Except for guards of the 48th Infantry and later Guard and Fire Companies, very few soldiers were stationed at this depot during the building operations carried on by civilian contractors. For this reason, no extensive drainage operations were undertaken, and routine inspection and oiling for mosquitoes was in the hands of the sanitary engineer stationed at the Army Supply Base near Norfolk. However, inspections made August 3 showed an abundance of Anopheles (*A. quadrimaculatus*) in the civilian barracks and tents. Immediate arrangements were made to take this matter in hand by the Malarial Drainage Detachment. An officer and a detail of 28 enlisted men began work on this problem about August 10. A whirlwind campaign was instituted over a period of four weeks which included an extensive ditching program embracing a large amount of extra-cantonment work, oiling, protection with head nets, bamber oil, collection of mosquitoes in tents and barracks, and quinine prophylaxis affecting both soldiers and civilian laborers. The result was most gratifying in that but four cases of malaria developed during late August and five in early September, a total of nine local cases for the entire season in a military population numbering about 725.

Army Supply Base near Norfolk embraced a large acreage of swamp much of which was permanently eliminated by the use of hydraulic dredges under contract. Necessary mosquito control work, which consisted of some ditching, the installation of two automatic drainage gates and the systematic oiling of the sundry pools, was carried on by the camp sanitary engineer with the aid of a small detail of enlisted men. All extra-cantonment drainage work was carried on by the U. S. P. H. S. Although a few anophelines (*A. quadrimaculatus*) were found at the base hospital, no cases of malaria originated at this camp and there was little complaint about mosquitoes in general.

The City of Newport News presented numerous drainage problems affecting the many military organizations located within the city limits. The city is inadequately sewered, and existing storm sewers presented clogged catch basins much of the time during the summer. Gutters and ditches in many parts of the city, originally designed to carry away water, became stagnant pools swarming with mosquito wrigglers.

Little or no attempt was made by the city authorities to correct these conditions, and the U. S. P. H. Service did not consider the control of mosquitoes in general except where anophelines existed. At times during the summer, mosquitoes became abundant enough to be the cause of numerous complaints, and anopheline adults were taken in the heart of the city at frequent intervals. As a matter of protection to the military population, the Malarial Drainage Detachment was instructed to carry out control measures in various parts of the city during August and September. This work included the maintenance, regrading and cleaning of a mile and a quarter of ditches (6,920 feet), construction of a few new ditches (total of 500 feet) and the application of 450 gallons of oil to mosquito breeding pools (Table 1).

Inspection and Oiling.—Inspection for mosquitoes was divided into two phases: (*a*) the inspection of all possible breeding places with the collection of samples for laboratory breeding, and (*b*) the collection of adult mosquitoes in and about the quarters and buildings as a prophylactic measure and for laboratory purposes.

This work was done by both white and colored enlisted men that had been trained in this special line of work by their officers.

Inspections were made at least once a week of each subdivision of the territory covered by the particular detachment. The presence of larvae was reported to the detachment commander daily, and oiling by a special detail formed for this purpose followed. The oiling was immediately followed by another inspection.

The cost of inspection and oiling totalled 28 per cent of the entire cost of the work done by the Malarial Drainage Detachment. The oil used was a half and half combination of Mexican crude oil and kerosene. Three hundred and ninety-three barrels were sprayed during the season, the cost of spraying per barrel totalling $14.37. This apparently excessive cost of application was due to the intensive character of the spraying and the long hauls necessary to carry out some of the work. There was very little opportunity or necessity for spraying large areas, in which case the pumps would be emptied quickly and the cost of application per barrel decidedly reduced.

The oil was delivered to the detachment camps by tank trucks and stored in barrels until used. Myer's knapsack spray pumps were used for the work. The first oiling for the season was done during the week ending May 18 and the final application was made during the week ending November 2. Applications during the height of the season were made about every ten days. However, considerable variation in time was necessary, depending on the weather conditions; for example, oiling was repeated several times at intervals of five or six days when the weather was excessively hot, dry and windy, and during cooler weather two weeks might elapse between oilings. Careful inspections and a good knowledge of mosquitoes are essential in such operations.

Records.—Each detachment was assigned a given area for which it was responsible. These areas in turn were subdivided into plots to which letters were given in order to facilitate the giving of directions and the tabulation of collections.

Each detachment made a weekly report of the mosquitoes, both larval and adult, that were taken during the week, designating the subdivision in which they were taken. In this way the surgeon's office was able to exercise a fairly accurate check on the effectiveness of the control measures under way.

A large blue print map in the surgeon's office was also kept up to date by spotting with map tacks the occurrence of the different anopheline species, the occurrence of cases of malaria, as well as the location of ditching and oiling operations.

Weekly reports were submitted covering the activities of the detachments for the previous week, such as the number of feet of ditch built or maintained, barrels of oil sprayed, acres of brush cleared, etc. From time to time, these records were consolidated and curves prepared to show the relation of the work to the set program. Special problems were covered by extra reports accompanied by maps and drawings.

Species of Anopheles.—Three species of anophelines occur in this vicinity—*A. quadrimaculatus*, *A. crucians* and *A. punctipennis* in order of their abundance.

Their local distribution seems to depend entirely on a given set of ecological factors, *A. crucians* occurring in the neighborhood of slightly brackish water, *A. quadrimaculatus* in the so-called typical anopheline breeding places such as wayside pools, neglected ditches, and the borders of impounded water, while *A. punctipennis* is found where wooded areas occur.

With these factors in mind, it is interesting to note that collections at Camp Stuart showed *A. crucians* almost exclusively; Camps Hill and Alexander, *A. crucians* and *A. quadrimaculatus*, Nansemond Ordnance Depot, *A. quadrimaculatus* greatly predominating and *A. crucians;* while at Camp Morrison, which is farther removed from the tidewater and in the midst of a wooded area, *A. quadrimaculatus* persisted to the extent of fifty per cent for all collections and *A. crucians* and *A. punctipennis* in about equal proportions. Again, at Lee Hall when the nearby wooded marsh was controlled, *A. punctipennis* practically disappeared and *A. quadrimaculatus*, breeding in the nearby impounded water of the reservoir became the dominant species.

The first anopheline larvae for the season of 1918 were seen May 11 at Camp Stuart and were all very young. It is interesting to note that these were discovered together with Culicine larvae in water barrels piled near a warehouse. Mosquito collections made at this time embraced only Culicine species, larvae and pupae of these being encountered in abundance during the last week in April. Anopheline adults began appearing in the collections about May 15 when *Anopheles crucians* began to be taken under the wards at the Embarkation Hospital where they appeared in increasing numbers for about two weeks, having originated, it is believed, in a portion of Salter's Creek marsh, three or four hundred yards distant. In this marsh great numbers of anopheline larvae were found from which this species (*crucians*) was bred. With the correction of this location by ditching and oiling during June the number of Anophelines in the collections became very low, ranging from 140 at the beginning of the month to zero during the first week in July for the same area. Thereafter, weekly collections for this area included Anopheles (all *crucians*) as follows: 8, 1, 11, 2, 1, 3, 3, 2, 5, 5—which indicates in a very fair manner the degree of control exercised in the vicinity of Embarkation Hospital at Camp Stuart.

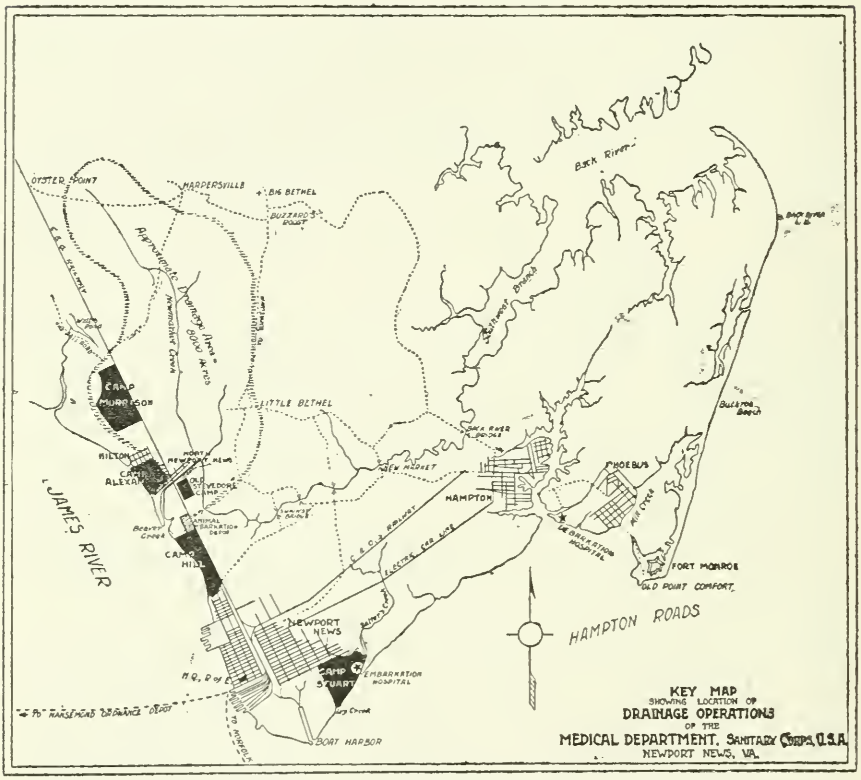

Fig. 1.—Key map showing military camps and area in which malaria drainage operations were conducted in the vicinity of Newport News, Virginia, by the Medical Department (Sanitary Corps) of the United States Army during 1918.

While *Anopheles crucians* and *A. punctipennis* were the first to appear and persisted in greater or less numbers during the entire summer in a given locality, *A. quadrimaculatus*, appearing somewhat later, rapidly became the dominant species for the region.

As late as the second week in November, anopheline larvae, ranging in size from very small to practically full grown, were seen in large numbers in impounded waters in Newmarket swamp. About fifty of these in various sizes were transplanted to a pool that was screened and observations were made to determine their fate. These larvae grew slowly and the older ones pupated, one by one, favored by occasional warm periods and the imagoes (mosquitoes) emerged. An examination made on December 26 showed one full sized larva remaining on the surface and careful search in the mud failed to reveal a single larva hidden therein where it was thought that overwintering might perhaps take place until spring when further development would be continued.

Occurrence of Malaria.—A total of 144 cases of malaria were treated at Embarkation Hospital, where all cases and suspects were sent during the malarial season of 1918, the first case reporting on April 8 and the last on December 12. This is a fairly accurate statement of all the cases actually occurring, as all suspects were hospitalized at once and diagnosed only on the basis of a positive blood smear.

Complete histories were made whenever possible of the cases and in every instance sufficient data was secured to determine whether the case was of local origin or imported. A tabulation of this information showed that 44 cases were contracted within the zone controlled by this port while 100 were contracted elsewhere, although treated at embarkation hospital. Attention is invited to the rather striking point that no cases originated at the large camps, Stuart, Hill and Alexander, where the great majority of the troops were quartered. All cases of local origin became infected at the outlying camps, Morrison, Lee Hall and Pig Point, where the extra-cantonment mosquito breeding conditions were so extensive that perfect mosquito control was not possible of accomplishment by the army authorities.

Accurate histories of 60 per cent of the imported malaria cases showed that 40 per cent of the infections were contracted at home before entering the service, while Camp Johnston, Florida, and Camp Eustis, Virginia, contributed 20 per cent and 13.3 per cent respectively, the remainder being scattered.

The infections were all of the tertian variety except three cases of estivo-autumnal (all imported), one of which, the only fatal case, was a mixed infection of tertian and estivo-autumnal.

The appended table (Table 1) gives a consolidated tabulation of the camps, month, and infection foci (whether local or imported) of all the cases occurring during the season of 1918. In the consideration of this table it must be borne in mind that the rate per 100,000 is for morbidity

Table 1.—*Malarial Control Work Done by the Sanitary Corps, P. of E., Newport News, Va. (Season's Report,* 1919).

	Alexander and Hill	Rifle Range	Stuart & Brewery	Morrison	City of Newport News	Pig Point	Lee Hall	Total
Lineal feet. New ditches	10,800	12,600	18,050	1,610	500	3,500	4,700	51,760
Lineal feet. Old ditches maintained	17,290	1,480	22,660	6,355	6,920	2,300	620	57,625
Acres cleared and weeds cut	24	15	41	25		3	3	111
Cubic yards fill	242			214				456
Gallons oil used	9,035	1,690	4,525	2,468	450	950	650	19,768

Table 2.—*Showing Distribution of Malaria Cases at the Port of Embarkation, Newport News, Va., April to December (incl.)* 1918.

1918	Camp Stuart		Camp Hill		Camp Alexander		Camp Morrison		City detachments Newport News		Reservoir guard Lee Hall		Ordnance Depot Pig Point		Army supply base, Norfolk		Totals		Grand Totals	Monthly strength	Malaria rate per 100,000 (Local morbidity)
	Loc[1]	Imp[2]	Loc	Imp	Loc	Imp	Loc	Imp	Loc	Imp	Loc	Imp	Loc	Imp	Loc	Imp	Loc	Imp			
April						1												1	1	24837	0
May		5		2		4						1						12	12	30098	0
June		8		7		2		1		1				1		1		21	21	31822	0
July		6		3		5		1			3					2	3	17	20	23460	13
Aug.		8		1		6	3	2		1	8		4	1			15	19	34	25431	59
Sept.		6		3		2	6	4		1	7		5				18	16	34	28237	63
Oct.				9			1				5						6	9	15	24276	24
Nov.				3		1					1						1	4	5	27772	3.0
Dec.						1					1						1	1	2	24125	4.0
Totals	.....	33	.....	28	.....	22	10	8	.....	3	25	1	9	2	.....	3	44	100	144	153301	28.7

[1] Local cases. [2] Imported cases. [3] Malaria rate for July to December inclusive.

and not mortality as usually given. It is generally estimated that one death may be expected from every fifty cases. With this as a basis, the local morbidity total of 44 cases would be equivalent to .88 deaths, or a mortality rate of .57 per 100,000 as compared with 4.6 for the registration area of the United States.

A more direct comparison of the degree of protection afforded men at the port of embarkation is found in a consideration of the local morbidity rate of .28 per 1,000 and the admission rate from malaria for troops in the United States for 1917 of 7.46 per thousand and the statement of the Surgeon General that the incidence of malaria in the Southern Department for 1917 was 6.8 per thousand.

The comparison of these figures, although comparatively accurate, should be tempered by the fact that the constant flow of men through the port rendered the final statistical results not strictly comparable with fixed stations or populations.

The question may be raised as to whether men quartered here for a few days did not become infected and manifest symptoms only after they had embarked for overseas. It seems fairly safe to assume that this was not the case, for practically all the overseas troops were quartered at Camps Stuart, Hill and Alexander before embarkation, at which camps none of the troops permanently stationed became infected and furthermore, no reports of malarial admissions of overseas troops on transports were reported to this office.

SOME COMMONLY MISAPPREHENDED POINTS IN THE DIAGNOSIS OF PELLAGRA[1]

By JOSEPH GOLDBERGER

Surgeon, United State Public Health Service

AMONG the diseases affecting sailors and soldiers, scurvy and beriberi long ago won for themselves a position among those of foremost importance. Although having many important epidemiological characters in common with these diseases, pellagra has differed notably from them in that it has not been known to occur on ships nor in armies either in barracks or in the field. The exemption of the military services even of those countries in which pellagra has been highly endemic has been most striking. Thus prior to the World War pellagra was practically unknown in the Italian,[2] the Egyptian,[3] and the American[4] armies. So much does this appear to have been the case that Zambelli (cited by Triller, 1906, p. 39) has stated that young pellagrins soon recover on entering the Italian Army. The recent report of an epidemic of this disease in Turkish prisoners of war in Egypt[5] is therefore of exceptional interest in that it would appear to be the first recorded instance of the kind in the literature, and in that it gives to pellagra a military significance that it has heretofore lacked.

Not the least of the many interesting observations to be found in this Egyptian report is the statement that the medical officers failed to diagnose the disease until such time as typical cases were recognized from text-book description. Although this failure is attributed to unfamiliarity with the disease on the part of medical officers, the present writer's experience leads him to suggest that an erroneous conception of the clinical picture of the disease was very probably an important contributing element. It would seem worth while, therefore, to pass in review those of the clinical features of the disease to which diagnostic significance is more or less commonly attributed and to point out some of the misconceptions attaching to them.

As is well known, the manifestations of pellagra fall into three groups, namely, those of the skin, those of the digestive tract, and those of the nervous system. Some systematic writers have, therefore, come to speak of the "diagnostic triad" of symptoms, or, alliteratively, as "dermatitis, diarrhea, and dementia." While these three d's are doubtless helpful to the student in recalling the symptoms of pellagra, they unfortunately tend to mislead the inexperienced, for in reality the three are encountered together in but a small proportion of all cases seen at any one time. To a lack of appreciation of this fact are ascribable many of the failures to recognize the disease.

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[1] Read at annual meeting at New Orleans, La., April 22–24, 1920.

[2] Lavinder, 1911.

[3] Sandwith, 1915.

[4] Goldberger, Waring and Willets, 1914.

[5] Report of a Committee of Inquiry, Alexandria, February, 1919.

In the present state of our knowledge the eruption is the most distinctive and sure indication of the disease. It is, therefore, of more than ordinary importance to have a clear understanding of the characters which, taken together, distinguish this from other eruptions and which give it pathognomic value. The characters that are especially to be kept in mind are the pigmentation with keratosis and sharpness of delimitation of the lesion. To be kept in mind also is the manner of its evolution. The eruption is usually described as beginning with an erythema, but it seems to have been overlooked or is not sufficiently recognized that this erythema at times is very fleeting and in some instances altogether inappreciable. The most serious misconceptions connected with the eruption are probably those that relate to the site of its localization and to its bilateral symmetry.

As is well known, the skin of the backs of the hands, that of the backs of the feet and of the neck are the sites most commonly affected. These parts being exposed to the sun, Frapolli (1771), the first to describe the disease from Italy, was led to attribute the dermatitis to the action of the solar rays. So plausible did this interpretation seem that some uncontrolled experiments by Gherardini (1792) and Strambio (1796) were accepted, seemingly without question, and have been handed down ever since, as proof in its support. In view of the oft-repeated citation of these experiments, it will be of interest to examine the original accounts of them to see for ourselves just what they were.

Gherardini, it seems, induced each of ten pellagrins to expose some part of a previously affected area of skin to the direct rays of the sun for several hours on several successive days in the month of June, with the result that the parts thus exposed became red and glistening. That the skin should have become red and glistening under the circumstances mentioned is no more than, if indeed it is as much as, might be expected if the skin of a nonpellagrin had been similarly treated. Strambio gives no details of his experiments; he simply states that he was able to confirm Gherardini's results in innumerable trials. In this connection, reference may also be made to some experiments reported by Bouchard in 1877 not infrequently cited as confirming those of Gherardini and of Strambio. Examination of the original report discloses that Bouchard's experiments simply tended to show that solar erythema is due to the action of the chemical rays of the sun. They had nothing whatever directly to do with pellagra. Clearly, then, the significance that has for so long been attributed to these experiments has been without substantial basis. Notwithstanding this, however, they have stood, as already remarked, almost unquestioned in the literature and have contributed very materially to the maintenance until relatively quite recently of Frapolli's idea.[6] It is probably in large measure due to this that lesions on other than "exposed" parts were not definitely recognized as pellagrous until about 1905.

The repeatedly observed occurrence of the characteristic eruption on covered parts of the body and in bed-ridden patients would seem to be conclusive evidence that sunlight is not an essential factor in its production.[7] Furthermore, Neusser's[8] observation in Roumania that in naked children the pellagrous eruption appeared on the hands and feet, the rest of the skin showing only increased pigmentation without the least pathological alteration, would seem to indicate that the site of the eruption is a specific character of the disease quite independent of the action of the sun's rays.

In harmony with this interpretation is the fact that in all of Goldberger and Wheeler's[9] experimental cases that presented the eruption, this appeared first on the genitalia; indeed, this observation would seem to render any other interpretation untenable as has in fact already been pointed out by these workers.

The fact that the eruption appears much more commonly on some parts (hands, feet) than on others (elbows, knees, genitalia) has led some students to speak of normal and abnormal (Fiocco, 1912) or of typical and atypical (Merk, 1907) localizations, respectively. The characterization of the less commonly affected sites as "abnormal" or "atypical" tends to be misleading in that it is thereby implied and, indeed, by Merk, definitely stated that such sites are of inferior diagnostic significance. That quite the contrary may be the case is at least inferentially suggested by Lavinder and Babcock's remarks (Lavinder and Babcock, 1910, p. 172) that "in doubtful cases involvement of the elbows ["an atypical site"] is an aid to diagnosis," and is supported by the fact that the normal or typical sites (hands, feet) are more frequently affected by conditions (such as eczema, chapping, simple sunburn, senile pigmentation with atrophy) which may simulate or be simulated by the pellagrous eruption than are such "abnormal" or "atypical" sites as the elbows, knees, male genitalia, sacrum or spine. Furthermore, the opinion of some observers that the so-called abnormal localizations of the eruption occur only in grave cases, is a generalization not entirely borne out in the writer's experience. That it must be qualified, most observers of experience will probably agree, and is proven by the fact that none of Goldberger and Wheeler's experimental cases with eruption (that in all instances first appeared on the scrotum) could properly be classed as anything more than mild.

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[6] For an excellent discussion of the relation of sunlight to the pellagrous erythema, see Merk, 1909, pp. 43–48.

[7] The experience of the writer and that of his coworkers has failed entirely to afford any confirmation of the reported instances of protection from the eruption of areas covered by bands of cloth, finger rings, etc. If such protection were really effective, instances of it should be quite common.

[8] Neusser, 1887.

[9] Goldberger and Wheeler, 1920.

Judgment as to the pellagrous character of a suspicious eruption is naturally influenced by a consideration of the relative frequency with which different sites are affected. But in this connection it may be well to recall that distinct differences in this respect have been reported from different localities and in the same locality in different years. Thus, it is of very great interest to note that no mention is made in Merk's monograph of the palms or soles as localizations, whereas "it is by no means uncommon in South Carolina for the palms and soles to be almost as severely involved with the pellagrous inflammation as are the dorsa" (Lavinder and Babcock, 1910, p. 173). Indeed, in one instance in the present writer's experience the dermatitis involved the soles of the feet as the initial site.

Bilateral symmetry is a very striking and notable character of the eruption, but the dictum of some eminent authorities, that an eruption that is not bilaterally symmetrical is not pellagrous, is in need of qualification, for in the early stages of its evolution or rarely even when it is quite well developed, the dermititis may be decidedly asymmetrical or appear on one side only.

The seeming tendency of the eruption to recur is a feature to which quite unwarranted diagnostic importance has been attached by some students. To be sure, judgment as to the nature of a suspicious eruption may be aided by a good history of a previous eruption or by the subsequent appearance, during the same or a succeeding year, of a clearly marked eruption. The failure of a recurrence to develop, however, cannot be regarded as evidence of the slightest value against the pellagrous nature of a previous eruption.

It is commonly taught, and the "diagnostic triad" would lead one to expect, that diarrhea is to be met with in nearly, if not quite all, cases. In reality, however, when all types of cases observed in any one season are considered, quite the contrary would seem to be the fact. In the majority of cases the bowels act either with normal or somewhat lessened frequency; in the experience of the writer and his associates, looseness of the bowels is encountered mainly in the more severe or advanced forms, which, however, constitute but a minority when account is taken of all cases. This misconception is probably due, at least in part, to the fact that in the main only the severer cases come to the attention of the clinician. However, even in well-marked cases, that is, cases with a well-marked dermatitis, constipation is not at all infrequent. While it is, indeed, probable that in such instances diarrhea may develop at a later stage, the practically important point to remember is that, in cross section as it were, the clinical picture encountered may be quite lacking not only in this, but, indeed, in all manifestations referable to the digestive tract.

In relation to the nervous system, reference may be made to the impression conveyed by the oft-repeated statements in the literature that pellagra inevitably leads to mental deterioration and insanity—the third element in the diagnostic triad. That this may and does occur under some circumstances is undoubtedly true, but the experimental demonstration[10] that the disease is completely preventable by means of a suitable diet clearly proves that insanity is not inevitable and need not occur, for it effectually disposes of the underlying fallacy that "once a pellagrin always a pellagrin." In this connection it may be emphasized that, although symptoms referable to the nervous system are of very common occurrence, cases (in children and the insane) are by no means rare in which these can be detected only with great difficulty or not at all.

From the foregoing discussion it is evident that cases may be encountered in which, of the "diagnostic triad," the dermatitis alone is present. It is likewise true that cases may be met with, and not rarely, in which the clinical picture is complete save for the absence of any evidence of the eruption, the so-called *pellagra sine pellagra*. The failure of gastrointestinal and nervous symptoms in the former class of cases should constitute no bar to the diagnosis of pellagra; the absence of the eruption in the latter, however, imposes extreme caution and reserve, although under some circumstances a positive diagnosis may be fully warranted.

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LESSONS OF THE WAR WHICH MAY BE APPLICABLE TO CIVIL PRACTICE[1]

By JOHN SMYTH, M.D., F.A.C.S.

IT HAS been my privilege to serve with the military forces in France and I thank you for the pleasure as well as the honor of addressing you here today.

In recounting the lessons of the great war, the time is too short and this paper necessarily too limited to do more than summarize.

Some authorities have expressed disappointment that so little, in their opinion, has been brought out by this war; others have enthused over the wonderful advancements resulting from this great struggle of nations.

To the conservative, the true condition must appeal—that much that was old has been retained and that some that was new had to be discarded. Some of the old has been improved yet in principle unchanged, while a great deal that is new has been added, some of unquestioned merit, and part upon which time alone may place a value.

In the treatment of wounds, we find definite advance over the pre-war methods, while the principles are not entirely new.

As stated by Blake, the military surgeons, at the onset of the war, "assumed that the great majority of wounds would result from small arms and that the casualties from high explosives would be in the minority; also, that rifle bullets would produce clean, neat perforations."

There was no conception of the fact that the full-jacketted bullet could so often cause bursting and shattering effects. Consequently inadequate provision was made and when the avalanche of wounded descended with lesions of indescribable magnitude and laceration, and mostly containing foreign and infectious material, a demand naturally arose from the overwhelmed surgeons for some means to combat the frightful infections which ensued. Thus recourse was had to antiseptics which Blake terms "retrogression, rather than progression."

The principle that well-nourished tissues can withstand and overcome infection while, on the other hand, tissues bruised and deprived of their circulation, not only cannot destroy bacteria, but become actual culture media favoring the developing of the infection, although perfectly well recognized and understood before the war, was often overlooked and forgotten.

The treatment of war wounds may be said to have passed through three stages. The first stage, that of debridement; the wound was laid open, foreign material removed and the tissues left to eliminate by natural processes those portions which could not live. To combat the fulminating infections resulting from the favorable conditions for bacterial growth, various antiseptics were used; some directed against the bacteria, others rendering the destroyed tissues unfit for bacterial food. The evolution of the wound was characterized by prolonged elimination and suppuration.

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[1] Read at the annual meeting at New Orleans, April 22, 1920.

The second stage of treatment was that in which substances, such as the hypochlorites, were used to dissolve the destroyed tissues and thereby hasten their elimination. Of these, the most commonly used, at least in France, was Dakin's solution applied by Carrell method. "This treatment finds its chief indication for those wounds to which the complete operative treatment, about to be described, cannot be applied."

The third stage may be said to have commenced early in the war but not generalized before the spring of 1917. "It might well be called the stage of rational treatment, as it was based upon the principle that well-nourished tissues can not only withstand but can eliminate infection. . . . This consists, briefly, in paring (Epluchage) the surfaces of the wound, removing devitalized tissue and foreign materials and closing it immediately, or if, for certain reasons, this did not seem practicable, leaving the closure to a later date.

Although the principle of primary suture may not be new, rules were formulated for its application, which included organization of personal and covered questions of transport, hospitalization, etc., and which should be of inestimable value in case of future wars, besides being applicable to a certain extent in civil surgery.

This treatment has saved time and dressings and reduced the period of hospitalization, but it's success is "inseparably connected with the life history of the infecting organism." (Blake.)

Some of the results of this treatment may be summed up as (1) shortened convalescence, (2) saving of hospital space, especially ward space, (3) saving of dressing materials, (4) lessening of disability by closing the gap to be filled in by scar tissue, (5) cosmetic (Hinton).

In the suture of war wounds, clinical judgment was relied upon by many, as Hinton says, wounds clinically but not bacteriologically clean did well after suture, were Carrell's dictum strictly followed out less than 50 per cent of these cases would have been unsuturable. Most of the failures occurred where the pyocyaneus appeared.

To suture part of the wound, or even the entire wound and have part of it break down, is better than to do nothing, unless there is some strong clinical or bacteriological contraindication.

Most observers agree that the presence of streptococci or gas bacilli is a contraindication to suture, and the custom of culture, and to close the wound after the count showed less than 1-5 was extensively adopted.

Clinical contraindications: (1) Inflammatory reactions, (2) serous discharge, (3) malodor, (4) fever, (5) tension when coapted, (6) multiple wounds on a very sick patient, (7) anatomical inability.

The Carrel-Dakin technique was found most useful in preparing wounds for suture. The principal objections were its predisposing to hemorrhage by dissolving bloodclot, suture and ligature material, and the impossibility of using it successfully during transportation since flushing every two hours on trains was often impossible.

This exacting technique, so well carried out in military organizations, renders its use in civil hospitals uncertain, especially with the limited number of nurses available in public and private hospitals now.

Dichloramin T in oil was found useful in sinuses and in superficial wounds not associated with bone lesions. In wounds of the bone, it was found to blacken the bone and separate the periosteum.

Many other preparations, such as Wright's Hypertonic solution and B 1 P., have been found of service. "Flavine in well-established infection is useless."

Tetanus.—The almost universal infection of war wounds by the tetanus organism owing to the intense cultivation over centuries of the fields upon which these wounds were received, demanded the most careful attention toward the preventing of so fatal a malady. Notwithstanding the early adoption of antitetanic serum as a prophylactic, the so-called late tetanus developed, and this was remedied only after it was found that the immunity resulting from the prophylactic dose lasted not more than fourteen days. It was also found that in certain wounds the tetanus bacillus remained for some months, and that disturbing these extensively, as in dressings, accompanied by the removal of tight packs or secondary operation, absorption of toxins would occur and tetanus could only be prevented by another protective dose of serum.

Gas Gangrene.—With the work of Taylor which showed that the gangrene was primarily a disease of devitalized muscle tissue, came the beginning of the proper conception of this rapidly fatal complication of so many of the earlier war wounds.

This resulted in the complete removal surgically of all possible divitalized muscle tissues, at the front, as well as of the dead and questionably viable muscle tissues from wounds received at the base, and the reduction of the enormous mortality of the first days of the war was most remarkable. This treatment was further supplemented by the use of anti-gas sera with more or less benefit.

While gas gangrene is, and will be, in civil life, far less common than was experienced in France, yet as our country becomes more densely populated and our fields more intensively cultivated, it is but reasonable to suppose that a relative increase in gas-infected wounds will occur and the knowledge derived from anaerobic infections during this war cannot but be of the greatest future value.

Shock.—Vast opportunity has been afforded for the study of the condition recognized as surgical shock and through the researches of Cannon, as well as the work of Delbert and Quenu, the factor of chemical toxemia, of non-bacterial origin, the result of rapid muscular proteolysis is emphasized. This, together with the appreciation of the disturbance of the nitrogenous and carbohydrate metabolism and acidosis, places our knowledge of this symptom complex upon a more sound basis and renders preventative measures and curative efforts more effective.

Chest.—Much has been added to the surgery of the thorax and many of the fears attending the pioneer work in this region have been shown to be groundless.

Pneumothorax, which has so long retarded the progress of interthoracic surgery, was found to be well tolerated in cases where the heart muscle was free from serious disease. Opening the pleura is considered no more dangerous than opening the peritoneum. The author concurs in this opinion providing the pleura can be successfully closed, since the omission of post-operative drainage is the most effective means of avoiding infection as well as collapse of the lung. It has been stated that the so-called flattening of the lung against the vertebral column when the thorax is opened occurs only in the cadava. This is true in the absence of a massive pleura effusion.

Early operation, that is, within eight hours after injury, with removal of all except minute foreign bodies, seems to have produced the best results. Infection was, in this way, prevented in a good proportion of cases, and since it has been well established that the majority of subsequent mortalities in chest wounds which survived hemorrhage and shock (those that lived over 48 hours) were the result of infection. Operation in suitable cases would seem to be the method of choice within the first eight hours; such operation should consist of removal of foreign bodies together with all infected tissue, even the path of the projectal in the lung, if possible, although it has been found that the lung tissue was much more resistant to infection than the pleura, and the careful suture of lung wounds as well as that of the pleura and chest wall.

As a rule, resection of ribs and cartilage should be avoided in anterior and lateral routes, rib retraction or flap dissection being preferred.

"Projectiles in the entire lung, the entire mediastinum, and the heart and its cavities may be removed." (La Fort.)

Careful radiological study must be made and all difficult cases should be operated with the aid of the screen.

Small projectiles in the lung may be extracted with forceps pushed through the tissues, their direction being observed on the fluoroscopic screen after the method of Petit de la Velleon.

The tolerance of the heart to injury and to manipulation is rather remarkable and La Fort notes that "pressure on the ventricles accelerates its action while pressure on the auricles slows it."

The immediate closure of sucking wounds has been found imperative, even if they had to be opened on account of infection later.

Face and Jaws.—Early suture of wounds of the face wherever practicable was found to shorten the process of healing and to limit the scar, thereby reducing the disfiguring effect.

"The time of suturing depends upon the location and severity of the wounds, the structures involved, and the degree of sepsis."

Wounds which enter the nasal or oral cavities always become secondarily infected.

Wide excision of infected tissue, as in other war wounds, is impracticable in wounds of the face; fortunately, however, the great vascularity of the tissue of this region, together with the apparent oral immunity to certain infection, renders suture here practicable which would be inadvisable in most other regions.

Wounds associated with comminution of bone do not do well, yet no attached fragment of bone, however small, should be removed.

Primary suture gives favorable results in superficial wounds involving the soft parts with little loss of tissue. Secondary suture may be done before the 12th day, but only after fixation of bone fragments and control of sepsis has been obtained.

Reconstruction work of any kind should not be attempted until suppuration has subsided, and complete healing of the soft parts; and cessation of dribbling must be secured before any attempt at bone transplantation is made. The method of using the crest of the ilium for graft in the lower jaw without any metallic means of fixation, as mentioned by Billington, Parrot, and Round, commends itself.

The evolution of prosthetic apparatuses, and the coöperation of the dentist and oral surgeon brought about by this war, promise much for this field of work in future.

Fracture.—To no single worker more than Joseph A. Blake belongs the credit of the evolution of the treatment of fractures during the long period of the great war, and his experiences and teachings will leave a permanent imprint upon the history of this section of war surgery, as well as mark a great advance in the methods of civil practice. The more universal employment and detail use of the Balkan frame in fractures of the extremities has been one of the great lessons and can only be appreciated by those who have experienced its use.

The great majority of fractures in civil practice are the result of torsion, yet those which are compound differ little from the war fracture except in number, extent, and character of foreign body and of infection, and as Blake has said, "The gravity of these infectious processes can be greatly modified by skill and proper treatment."

The improvement in treatment has been due to the discarding of the older idea of immobilization by fixation and the adoption of certain factors, the chief of which are traction, suspension and support with the principal view of preservation of function.

The method tends to relieve inflammatory swelling and later edema, the nutrition of the limb is improved, the motion of the joints sufficient to prevent ankylosis, the wounds are accessible and more easily dressed and the vital functions are conserved.

The operative treatment of fractures has also undergone some change. "The fixation of compound fractures by screws, plates, bands, or wires has proved to be bad practice," and the complete excision of all small fragments of bone so frequently followed by delayed or non-union has been supplanted by the more conservative practice of resecting only "enough bone to remove contamination and permit drainage." (Blake.)

We cannot leave the subject of fractures of the extremities without paying just tribute to the Thomas splint, that great addition to the few splints suitable to easy and prompt application and so admirably adopted to transportation of fractures and, as has often been said, it may well be called "The Splint of the War."

As stated by Jones in 1916, the mortality of the gunshot fracture of the femur was 90 per cent; in 1918 this high mortality was reduced to 20 per cent by the use of the Thomas splint as it adequately immobilizes the fracture, minimizes the resulting shock, and simplifies transportation.

The Pouliquen for the lower limb and the Jones traction splint for the upper extremity hold a valued place in the armamentarium for the treatment of fractures and joint injuries.

Joints.—The treatment of joint injuries has been, we may say, almost revolutionized, since the introduction of Wolm's method which conserves joint function by maintaining active motion. Again, the realization that the resistance of joint structures to infection is far in excess of that entertained before the large war experiences will be of much help in the surgery of this class of cases in future.

Amputations.—The guillotine amputation, so useful in certain cases of war wounds, will find but a small place in civil practice, and more conservative methods will obtain. However, the bone changes in war amputation stumps as reported by Orr are of much interest, and show the inadvisableness of open methods.

The cinematic or cineplastic amputations brought out by Cece, 1906, and Vaughitti, 1907, lay comparatively dormant to be awakened by the large number of amputations especially in the earlier part of the war, and while not adaptable to all amputations, undoubtedly this method has possibilities yet not fully developed and will in future attract more attention and find a larger proportionate use in civil practice.

Wounds of the abdomen, in the earlier part of the war, gave a mortality of about 65 per cent. This was during the period when, owing to the large number of these cases and the proportionately limited and overwhelmed surgical personnel, a method of waiting was adopted, and the recoveries were confined largely to those cases which developed only localized peritonitis and localized infections in general. However, as the better equipped stations were placed nearer the front and more prompt intervention made possible, it was found that operation within the 8-hour limit, so long observed in civil practice, gave the best results in war wounds and the mortality was soon reduced to 45 per cent. (Depage.)

Nerve.—In nerve injuries, it was observed that the condition of the muscles, tendons, and joints, more than the time interval between the injury and operation, effected the end results. Early operation is, therefore, indicated not because delay prevents nerve regeneration, but the long loss of nerve influence with resulting atrophy and contracture impairs the ability of muscle to react when the nerve path is reëstablished. (Jones) "Spontaneous regeneration should not be awaited more than two months."

Scar tissue must be excised, end to end approximation obtained and where protection is required "living muscle flap is indicated."

Cargile membrane, vein, or fat transplants for this purpose are less satisfactory.

Tendon transplantation gave best results in cases of irreparable nerve injury. The results are in direct proportion to the simplicity of function of the part.

Nerve grafting, bridging with foreign material, turning down of nerve flaps, nerve crossing, and anastomoses are all invariably failures.

The primary end to end approximation, where practicable, will furnish the greatest number of cases presenting more or less satisfactory restoration of function. Cestan's (*Rev. Neural*, 1919) experience shows that suture under the most ideal conditions for the patient later than the fifth month gave no results or results that are very poor.

Burrow and Carter, in their investigations of 1,000 peripheral nerve injuries, state that, after suture, the musculospiral nerve show, the more rapid return of function, the median less rapid. In ulnar injury no early recoveries of the nerve were noted nor was complete return of function observed. The external popliteal was more frequently injured than the internal and, like the musculospiral, recovered rapidly.

Lesions of the cervical roots recovered very slowly.

Anesthetics.—Of the anesthetics, ether was the most used because available, though nitrous oxide was considered the safest. Pellot's mixture was found useful in operations which could be performed rapidly and Gwathmay's oral anesthesia will be found of value in civil practice.

Blood transfusion has been simplified, its dangers reduced, and its uses extended.

Mention of the surgery of the vascular system has been omitted since this is to be the subject of an address by Major Matas before the Association.

In conclusion, it may be well to remember that the statistics of different observers, of different sectors of the front, of different periods of the war, vary markedly; not due only to difference in treatment, but to varying conditions. The early part of the war, after the initial advance, was that of typical trench warfare, when the front line hospitals were more stable and transportation far less difficult and by means more comfortable; then came the period of retreat with the great loss of material and constant changing of hospital location, and finally, the period of rapid advance, which again demoralized hospital organization and congested transportation. All of these have had their influence on surgical results irrespective of the methods of treatment adopted or outlined from previous experience, and must play no small part in our interpretation of some of the lessons of the World War.

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CHRONIC URETHRITIS AND PROSTATITIS, DEPENDENT UPON COLON BACILLUS INFECTION[1]

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MODERN urologic literature is strangely lacking in reference to the Colon Bacillus as the dominating infecting organism in chronic urethritis and prostatitis of long duration.

Macroscopically, many of these cases present a picture of ordinary urethritis, and during the writer's military service, when in charge of one of the urological clinics at Camp Travis, many hundreds of cases were so diagnosed under the system at that time in vogue. A word of explanation is here necessary.

At Camp Travis the selectmen were received direct from their draft boards and the preliminary examination at our receiving station classified all men having an urethral discharge as venereals and these men were subsequently referred to the urological clinics for correction of diagnosis and treatment.

In approximately 30 per cent of all cases of urethritis and prostatitis coming under my observation the discharge showed an absence of the gonococcus but was loaded with the colon bacillus.

Practically all cases falling into this classification gave a history of repeated attacks of what had been diagnosed in civil life as gonorrhea. Many cases gave a history of having the disease for several years, the periods varying from six months to twelve years.

Few, if any, of the men complained of pain or distress; a small number complained of a diminution in the urinary stream. All cases were potent and none exhibited or gave a history of arthritis. In practically all cases the libido was strong but the ejaculation was hastened.

Rectal examination of the prostate and seminal vesicles revealed for the majority a small prostate, usually normal in the sense of touch with sometimes a small boggy spot. In a few cases the prostate was large and boggy; fluctuation was never noted.

A most interesting feature in the examination of these cases was the rarity with which associated seminal vesiculitis was noted and the absence of any history regarding previous involvement of the epididymus.

Urethral examination showed many and varied forms of stricture—limited for the most part to the anterior urethra. Verumontanitis was the rule, complicated very frequently with a cicatricial formation closely resembling stricture formation.

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[1] Read at annual meeting of the Association of Military Surgeons, New Orleans, La., April 22–24, 1920.

The anterior urethra showed a low grade of inflammation, a dirty grey color, and sometimes bled very easily even under the gentlest manipulation of the examining urethroscope. The follicles of Littre were punctate in appearance and frequently a minute drop of secretion could be seen exuding from them.

Contrary to the rule governing the treatment of venereal cases, these men diagnosed as nonspecific were given full military duty, and this seemed in no way to interfere with their improvement under treatment.

During the early days of the urological clinics these cases were regularly treated, as will be presently outlined.

Later on, when it was realized that these men could and did perform full military duty and were not, strictly speaking, venereal cases, a plan was devised by which these men could be certified as nonvenereal and they then became available for transfer to permanent organizations, and many such no doubt were sent overseas.

The plan above mentioned consisted of a certificate from the urological clinic which was to be attached to the service record of the man, giving the diagnosis in the case and an outline of the treatment as advised. This treatment could be administered by regimental surgeons and the man kept on full duty.

Owing to the chronicity of these cases the treatment was necessarily a long one and consisted of the following measures which, when consistently followed, did not fail to improve all cases seen by us.

Prostatic massage twice weekly, followed by a thorough irrigation of the bladder and urethra, with a very hot but mild solution of permanganate of potassium. Following this the patient was put in the recumbent position and an instillation of argyrol or silver nucleinate in a 10 per cent solution was done.

In stricture cases the urethra was dilated once weekly, preferably with a Kollmann antero-posterior dilator, and the washing and instillation as above mentioned.

A word as to our method of instillation.

The writer has long been convinced that the trauma, no matter how gentle the operator may be, consequent upon the passage of a hard instrument into the urethra, often does more damage than the instilled medicament can offset. For some years I have been using air pressure in making my posterior instillations, and it is remarkable how well borne these instillations are, together with the fact that the patient is well able to retain the injection for some time without distress. I use an all-glass syringe with an air chamber and rubber bulb of the type now manufactured by Becton, Dickinson & Co., and the method of procedure is as follows: The patient is put in the recumbent position, the left hand of the operator grasps the penis, and the meatus is made to fit firmly around the blunt end of the syringe, the injection is slowly made and as soon as resistance is felt the patient is instructed to strain slightly in order to help relax the cut-off muscle, slight pressure is made upon the bulb of the syringe, and the instillation is made.

This method combines the virtue of instillation with a degree of dilatation and is free from all trauma.

The patient is instructed to retain the injection for a comfortable period, and as a rule this is easily done.

The administration of sodium acid phosphate in alkaline urines and the use of hexamethylenamine covered our internal medication.

EDITORIAL

MEDICAL HISTORY OF THE WAR

Congress has recently granted an appropriation of $50,000 for the publication of the earlier volumes of the Medical History of the War. This appropriation will be available only during the coming fiscal year (July 1, 1920–July 1, 1921). It is therefore incumbent upon all who are engaged upon this work to do their best to have material ready for publication during the present year or to justify the publication of future volumes by the kind of material which they are producing or may produce. Material for some of the earlier volumes has been assembled and, in the case of one or two, is almost ready to be submitted to the Board appointed by the Surgeon General to pass upon the fitness of these MSS. for publication. It is hoped, therefore, that some of the earlier volumes will be shortly ready for the press. The preparation of the rest of the work will depend largely upon the time required to digest the material and prepare these volumes for the Board and the press. During the war period, memoranda were issued from time to time by the Executive Officers, S. G. O., urging upon the writers assigned to individual chapters the necessity of making their copy readable copy both as to the present editors and to future readers. It was pointed out that every effort should be made to make these contributions interesting and instructive. In the main the contributions received show that these suggestions have been heeded. As a matter of fact, it is doubtful if better material has ever been contributed for a work of similar character. Yet, now and again, an article is received which indicates that it is timely and proper to insist upon the points made once more. There is a well-known aphorism of Virchow that "Brevity in writing is the best insurance of its perusal." This view of things has an appeal to all who are readers of books or articles of whatever kind. There is nothing which will so distract and disengage a reader's attention, causing the mind to wander away from the printed page and to fall asleep, as to peruse material of a lengthy, prosy and consequently meaningless character. It is the besetting sin of modern writing whether it be history, fiction, philosophy, science or the routine copy dished up in such huge quantities for the magazines and daily newspapers. The poet Goethe once observed that "modern writers put a lot of water into their inkstands." A character in one of Schiller's plays inquires: "What is the brief substance of the lengthy speech?" These observations, by the greatest of German writers, were directed against the long sentences and lengthy arguments for which German literature is notorious. In France, to write even a newspaper feuilleton that is not terse, effective and to the point is to establish a definite bar to its publication. The rule is: *Tous les genres sont bons, hors le genre ennuyeux.* In the interest of our readers, it is incumbent upon all of us to make our demands upon their time as limited as possible. In trying out a new play upon the boards, a good stage-manager will immediately cut out all tedious monologues, platitudinous small talk, and irrelevant twaddle, confining himself to "lines that create atmosphere" and "lines that indicate character," in other words, to lines that get across the footlights and reach the audience. To do otherwise is to break the rules of the game and to ruin the prospects of a play, ignoring the rights of those who pay to see it performed. In writing, especially in the writing of official reports, there might be distinct advantages in observing this simple rule of the theater, which, in itself, is primarily a matter of business. To respect one's possible readers is certainly not to be theatrical.

While it is proposed in the forthcoming history to give due and proper credit to all who have done valuable work for the service and for their country during the war, it is worth while for the writers of MSS. to bear in mind the military rule in the Regulations which interdicts "deliberations or discussions among military men conveying praise or censure, or any mark of approbation toward others in the military service." Except in the case of the dead, the "foolish face of praise," let alone flattery, is bad form, since it implies an equal right to blame or censure. It is obviously worse form to make frequent references to one's own name in a military report signed by oneself. The fact that the name of the author is connected with the report or the particular piece of work should be sufficient. The man's work will then speak for itself.

The object of these histories is to relate how and by what means the medical forces of the Army were mobilized, what they did, how they were demobilized, what lessons may be drawn from the things accomplished and what errors may be avoided in the future. The task of the writers of the administrative reports is to tell impersonally what their organizations did rather than to inform us about themselves, their friends and their promotions. In the already printed sections of the British History of the War dealing with scientific medicine and surgery, this military plan of impersonal treatment is carried out rigorously (even the title pages are impersonal), although the essential feature of scientific investigation since the Greeks has been its personal and eponymous character. It is hoped that all who are working on this portion of the history will do their best to assemble the facts and data which will be most interesting and valuable for future generations.

Obituary

DR. STANTON A. FRIEDBERG (1875–1920)

Dr. Stanton A. Friedberg, who died in the Presbyterian Hospital, Chicago, on May 27, 1920, from the sequelae of an operation for mastoiditis, having served as a Major, M. R. C., at Camp Doniphan, and subsequently in France, was one of the best specialists in oto-laryngology in this country. He was born in Chicago on December 1, 1875, receiving his preliminary education in the public schools of Chicago and at Ann Arbor and his M. D. at the Rush Medical College (1897). After a year's internship in the German Hospital (Chicago) and two years of general practice, he began to specialize in oto-laryngology, in 1900, being at this time an assistant of the late Dr. E. Fletcher Ingals. He soon rose in his profession *via* important hospital appointments and through his skill and probity. While Consulting Layrngologist to the Durand Hospital of the John McCormick Institute for Infectious Diseases, he did his best piece of work, namely, that of tonsillectomy in diphtheria carriers (1907–8), with which his name is associated.

In November, 1917, he was commissioned a major in the Medical Reserve Corps and served for eight months in the Base Hospital at Camp Doniphan, Fort Sill, Okla. In September, 1918, he was sent to France as an officer of Base Hospital No. 85. He served eight months with the A. E. F., his time being divided between hospital work in Paris and Angers. He received his discharge on May 1, 1919. He did valuable work as an otolaryngologist in war service; his military record was of the best and he was not unnaturally proud of it. He was a member of many medical societies and the author of some thirty papers relating to his speciality. In 1919 he became secretary of the Chicago Medical History Society and editor of its *Bulletin*. He was a collector of rare books and medical engravings and had a unique collection of the basic texts in oto-rhino-laryngology arranged on shelves in chronological order. He married Miss Aline Liebman, of Shreveport, La., who survives him with three children.

The loss of this promising physician at the early age of forty-five will be regretted by all of his friends. While not of the sturdiest physique, he passed through more than the usual amount of hardship at Camp Doniphan, at that time one of the least attractive of the army camps; but, although bred in an entirely unmilitary atmosphere, he early acquired that humorous sense of proportion which makes a man fit to serve with organizations and his uniform cheerfulness and pluck, both during and after the war, stands in honorable contrast with the chorus of complaints and general repining, which have since emanated, strangely enough, from many who had experienced almost none of the physical hardships which are a commonplace of the soldier's lot.

COMMENT AND CRITICISM

AIR SERVICE MEDICAL ASSOCIATION

At the second annual meeting of the Air Service Medical Association of the United States, held at New Orleans, La., on April 26, 1920, the following officers were elected for the ensuing year:

President, Col. Albert E. Truby, M. C., U. S. A., Washington; first vice-president, Lieut. Col. Robert A. Strong, M. R. C., U. S. A., New Orleans; second vice-president, Lieut. Col. Louis H. Bauer, M. C., U. S. A., Mineola, N. Y.; third vice-president, Col. J. O. McReynolds, M. R. C., U. S. A., Dallas; fourth vice-president, Lieut. Col. Isaac Jones, M. R. C., U. S. A., Los Angeles; fifth vice-president, Maj. Samuel Meredith Strong, M. C., U. S. A., Carlstrom Field, Fla.; secretary-treasurer, Lieut. Col. Nelson Gapen, M. C., U. S. A. (retired), Washington.

Council: Maj. Frank Cary, M. R. C., U. S. A., Chicago; Maj. James McKee, M. R. C., U. S. A., Philadelphia; Capt. David Webster, M. R. C., U. S. A., New York; Col. Eugene Lewis, M. R. C., U. S.A., Los Angeles; Col. Casey Wood, M. R. C., U. S. A., Chicago.

Historian: Col. Theodore C. Lyster, M. C., U. S. A. (retired).

MEDICAL SERVICE
U. S. Army General Hospital No. 28
Fort Sheridan, Illinois

May 15,1920.

The Editor, *The Military Surgeon,*
Washington, D. C.

Gentlemen:

The chairman of the Committee on Nursing, American Hospital Conference, has requested me to send this letter to you in order that it may be inserted in The Military Surgeon. It is desired that your subscribers be encouraged to report to me their views on the questions presented in this letter. Will you arrange to have the letter published in your paper with an invitation to any reader to communicate with me regarding the nursing question?

The American Conference on Hospital Service appointed a Committee on Nursing at its meeting held March 3, 1920. The members of this committee present made a resolution to study the nursing problem as it exists today in the United States and Canada.

A report from this committee is expected to be in the hands of the secretary one month prior to the meeting to be held October 4, 1920, at Montreal, Canada.

It is desired to secure information on the following questions:

Opinion of the value of the three-year course for nurses connected with hospitals, the two-year course for nurses connected with hospitals, the high school pre-nursing courses, the Red Cross extension courses, short courses and correspondence nursing courses.

Are the principles laid down in the nursing education in these courses right or wrong? If right, how can it be improved so as to adequately meet the nursing need? If wrong, how should the training of the nurses be made right?

What use are the graduates of these various schools making of this training? What misuse are the graduates of these schools making of their training?

What, if any, is the nurse wastage during training?

What, if any, is the nurse wastage after finishing their course?

What are some of the reasons for the shortage of nurses today?

What suggestions can be made as to changes in the training to make it efficient and not lower the nursing standard?

Sincerely,

E. D. Kremers,
Major, M. C.

USE OF ARSENIC PREPARATION IN TREATMENT OF SYPHILIS

TREASURY DEPARTMENT, BUREAU OF THE PUBLIC HEALTH SERVICE
Washington, *June*, 1920.

The Editor,
Military Surgeon,
Washington, D. C.

Sir:

On account of the large number of arsenic preparations which are being exploited for the treatment of syphilis, the United States Public Health Service has considered it desirable to issue a circular letter, copy of which is inclosed, discouraging the indiscriminate use of untried preparations.

Attention is especially invited to the fact that provisions are made for the experimental use of any preparation under conditions which will make the results of such experiment available to others than the physician immediately concerned.

I shall be glad to have you give the circular letter and this letter of transmission publicity.

Very truly yours,

H. S. Cumming,
Surgeon General.

Treasury Department, Bureau of the Public Health Service
Washington, *May* 12, 1920.

Bureau Circular
Letter No. 219:

Medical Officers, U. S. Public Health Service and others concerned:

Your attention is invited to the extensive exploitation through advertisements in professional journals and otherwise of various arsenic preparations which are not related to the arsphenamine group. The preparations referred to are sold with claims in regard to their value in the treatment of syphilis, which are unwarranted.

In the opinion of this office it is in the interest of all concerned that the subcutaneous, intramuscular or intravenous use of arsenic in the treatment of syphilis be confined to preparations of the arsphenamine group as these agents are of established value and are produced under the regulations of the Public Health Service. The following firms are now licensed for the manufacture of arsphenamine and neo-arsphenamine: Dermatological Research Laboratories, 1720 Lombard Street, Philadelphia, Pa.; H. A. Metz Laboratories, 122 Hudson Street, New York, N. Y.; Diarsenol Co., Inc., Buffalo, N. Y.; Takamine Laboratories, Clifton, N. J.

The Lowy Laboratory, of Newark, N. J., has been granted a license to prepare a stable solution of arsphenamine.

It is not the desire of the bureau to limit clinicians in the choice of agents of recognized worth but in the case of arsenic preparations, not members of the arsphenamine group, the available evidence indicates that their routine use is inadvisable in the treatment of syphilis. If it is desired to use any of these preparations in a purely experimental way previous authority from the bureau should be secured. Applications for this authority should be accompanied by a statement as to the composition of the drug, including the structural formula and the reason for its use. All information available on the value of the preparation should be forwarded.

Receipt of this circular should be acknowledged and marked "*V. D. Division.*"

H. S. Cumming,
Surgeon General.

* * *

INSTRUMENTS AND APPLIANCES

AN APPARATUS FOR DUODENAL AND INTESTINAL FEEDING AND THERAPY TRANSDUODENAL LAVAGE, AND PROCTOCLYSIS AND THE ADMINISTRATION OF STERILE SOLUTIONS[1]

By First Lieutenant J. BUCKSTEIN

Medical Corps, United States Army

(With three illustrations)

THE apparatus consists of the following:

1. Duodenal bucket. This is a gold-plated capsule-shaped bucket, (size 23 French). It has two lateral openings about the size of the lumen of the duodenal tube, and above this two small holes on either sides for sutures.

2. One tube of catgut.

3. One card of silk. The catgut and the silk are used as suture material. Where it is desired to permit the rubber tube to remain in the stomach or within the lumen of the intestine for a very short period as in the removal of gastric or intestinal material or where it is to be removed after a sojourn of only a few days, the suture to be preferred is silk. Where, however, the tube is to remain in the intestinal lumen over a prolonged period of time, catgut should be used as a suture. With the absorption of the catgut, the bucket is detached and leaves the intestinal tract.

4. A soft rubber duodenal tube (40 inches in length). This is perforated at the distal end for a distance of 1½ inches from the end for the purpose of minimizing occlusion. Longer pieces of tubing may be used where indicated.

5. At the proximal end of this tube is a gold-plated metal connection piece.

The following parts of the apparatus, 6, 7 and 8, fit snugly into this connection piece.

6. A gold-plated metal plug. After a feeding has been completed, and the duodenal tube cleaned, this solid plug is inserted. The proximal portion of this is ring-shaped. Attached to this is an elastic band, which fits around the ear.

7. A Luer syringe (20 c.c.). This is used for cleaning the tube before and after each feeding, and for removal of gastric and intestinal secretions.

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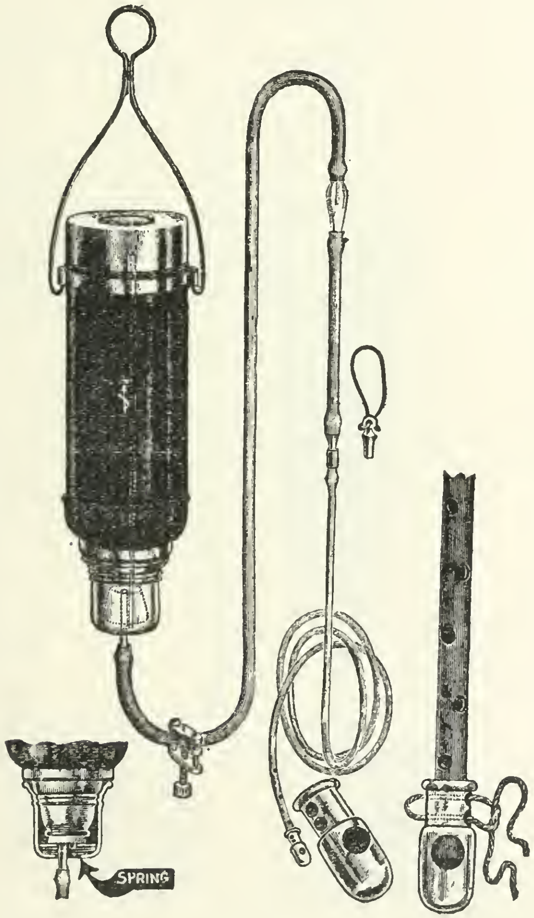
[1] From the Medical Service, U. S. A., General Hospital No. 41, Fox Hills, Staten Island, N. Y., Col. C. R. Snyder, Chief of Staff, Col. J. H. Ford, Commanding Officer.

8. Metal connection piece, slip joint, which connects the remainder of the apparatus with the duodenal tube when feeding is begun.

9. Vacuum container. This is an unbreakable bottle fitted with a soft rubber stopper, containing an air inlet tube, a fluid outlet tube and a graduated gauge, to measure the rate and amount of flow.

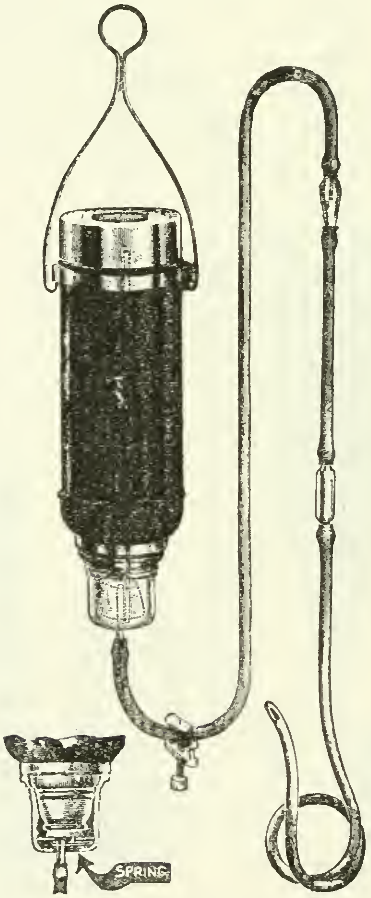
Apparatus for Duodenal Feeding



10. Adjustable collar and detachable hanger, for supporting the inverted vacuum container.

11. Cover for container. This is perforated at its top so as not to obstruct the exit for the fluid outlet tube, the air inlet tube and the gauge. Within the cover is an adjustable spring. In screwing on this

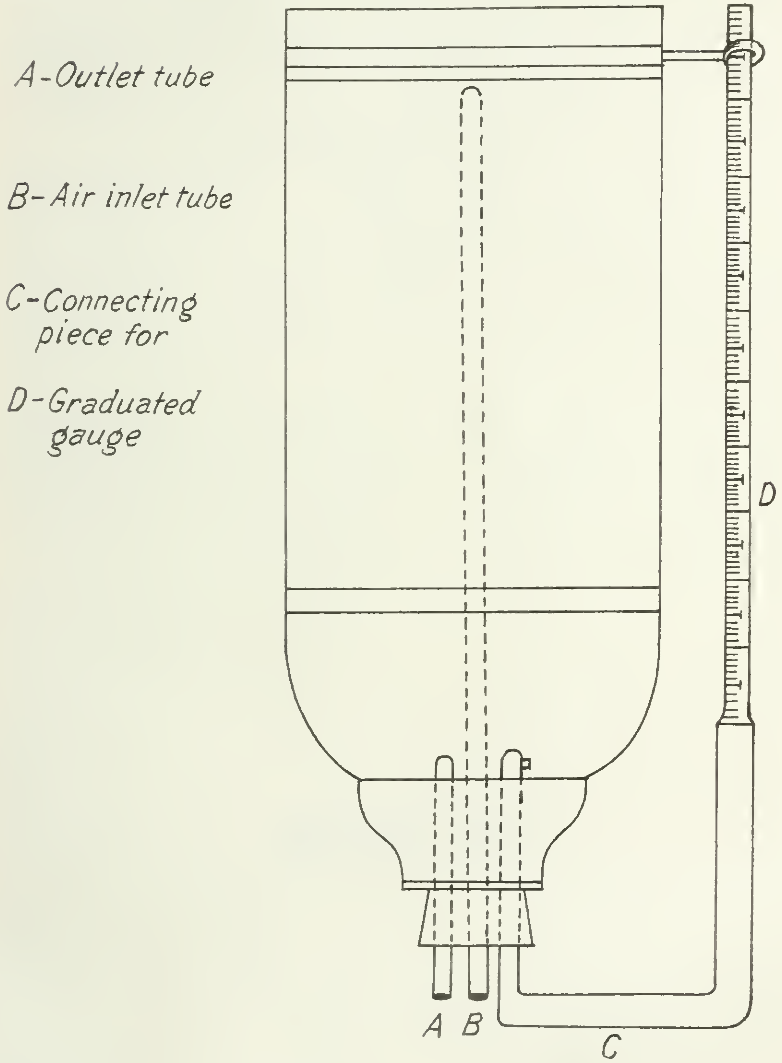
Apparatus for Proctoclysis



top cover over the bottle the spring adjusts itself to rubber stoppers of varying lengths. As the vacuum container is inverted when the introduction of fluid is begun, this arrangement is important in preventing the rubber stopper from slipping out.

12. Soft rubber tubing 7-mm. outside diameter. One end is connected with the fluid outlet tube, the other end is connected with—

13. Glass drip bulb, small size, to determine the number of drops per minute. The flow through this bulb is regulated by means of—



14. Hoffmann's screw cut-off.

15. A piece of rubber tube similar to 12 connects the glass bulb with the metal slip joint mentioned in item 8.

In addition the outfit is supplied with:

16. One straight needle for suture.

17. Wire stylet 45 inches long to aid in the introduction of the duodenal tube.

The above described apparatus is useful not only for feeding but also for the introduction of medication and for transduodenal lavage.

By substituting a different connecting piece for the metal slip joint, and attaching a rectal tube, we have an apparatus for the rectal administration of fluid material.

The vacuum container is ideally suited for the administration of sterile solutions by hypodermoclysis and intravenously.

The container can be readily sterilized. The great objection, that the flow of fluid from the container into the vein, cannot be seen, so that the rate of flow and the quantity of fluid at any time, cannot be determined, is overcome by means of the graduated gauge. As this measures the level of the fluid within the container at any given time, it is possible to quantitatively graduate the amount of fluid injected, and by means of a screw clamp to regulate the rate of flow. We thus have the advantage of an unbreakable, sterilizable container, which helps to maintain the temperature of the contained fluid, and the quantity of which fluid can at any time be measured. A container so constructed can be used for the injection of normal salt solution, glucose solutions, citrated blood for transfusion, salvarsan and other sterile solutions.

BOOK REVIEWS

Diseases of the Nervous System. A Text-book of Neurology and Psychiatry by Smith Ely Jelliffe, M.D., Ph.D., and William A. White, M.D. Third edition, revised, rewritten and enlarged. Illustrated with 470 engravings and 12 plates. Philadelphia and New York: Lea & Febiger, 1919.

This is a comprehensive work of a thousand pages and has been largely rewritten and added to. The subject of the endocrinopathies has been much elaborated in view of the added importance which this subject has assumed in the field of internal medicine. Much new material has also been brought out in the chapter on vegetative neurology.

The subject of sensorimotor neurology has been revised and brought up to date in accordance with the experience gained in the World War which brought to light many new hypotheses in this particular field.

The book throughout emphasizes the fact of the close association, the interdependence of various conditions as they exist in life.

The illustrations are ample and the appearance of the book attractive.

J. R. C.

Human Infection Carriers—Their significance, recognition and management. By Charles E. Simon. B.A.. M.D., Professor of Clinical Pathology in the University of Maryland School of Medicine and the College of Physicians and Surgeons, Baltimore, Md. Philadelphia and New York: Lea & Febiger, 1919. Price, $2.25.

Professor Simon has presented the profession with a concise and carefully written text-book on a subject that is constantly acquiring greater importance. The author discusses the problem under consideration only in connection with those diseases of bacterial origin or which are due to the activity of a filterable virus in the dissemination of which healthy human carriers are now known to play a rôle, viz., carriers who either have never passed through an attack of the corresponding malady themselves, or, having done so, have clinically recovered. The diseases so considered are cholera. diphtheria, typhoid and paratyphoid fever. dysentery, epidemic meningitis, poliomyelitis, pneumococcus pneumonia. certain streptococcus infections (such as camp septicemia, bronchopneumonia, septic sore throat, erysipelas and puerperal fever), influenza, and possibly also the pneumonic form of plague.

Under these headings the various phases of the carrier problem have been discussed, *i. e.*, the occurrence of active and passive carriers, the duration of the carrier state, the numerical relation between patients and carriers, the habitat and the virulence of the organisms, the mode of infection, concrete examples illustrating the danger of the carrier to others, the recognition of the carrier with a detailed description of the laboratory methods involved, and the management of the carrier from the standpoint of the public health officer. In conclusion, there have been appended the most important state laws, municipal ordinances, and the federal interstate regulations dealing with the carrier problem which have been enacted up to January 1, 1918.

The book will prove of genuine value to students of medicine, the general practitioner, the health officer, medical officers of the government services and sanitary engineers.

Francis M. Munson.

MANUAL OF PSYCHIATRY. Edited by Aaron J. Rosanoff, M.D. Fifth Edition. New York: John Wiley & Sons, Inc., and London: Chapman & Hall, Ltd., 1920.

This manual, which has as its foundation the work of Dr. J. Rogues de Fursac of Paris, has in its present edition been extensively revised and added to in order to bring it up to date and in accordance with the changes in this branch of medicine consequent on late knowledge of the subject and what was learned during the progress of the war. The contributors to it are Drs. de Fursac, Rosanoff, and Clarence A. Neymann and H. L. Hollingsworth and Miss Mary C. Jarrett. New chapters on many subjects have been added, among which may be noted those on extra mural psychiatry, psychoneuroses, hyperthyroidism, the Stanford revision of the Binet-Simon intelligence scale and the classification of mental diseases adopted by the American Medico-Psychological Association.

The work is divided into three parts, General Psychiatry, Special Psychiatry and appendices dealing with technique of special diagnostic procedures. It is complete and up to date and of interest both to the student and to the specialist in this field of medicine. It comprises some six hundred and fifty pages.

SURGICAL SHOCK AND THE SHOCKLESS OPERATION THROUGH ANOCI-ASSOCIATION, by George W. Crile, M.D., Professor of Surgery, School of Medicine, Western Reserve University, Cleveland; and William E. Lower, M.D., Associate Professor of Genito-Urinary Surgery School of Medicine, Western Reserve University, Cleveland. Second Edition of "Anoci-Association," thoroughly revised and rewritten. Octavo of 272 pages with 75 illustrations. Philadelphia and London: W. B. Saunders Company, 1920. Cloth, $5.00 net.

With the above title Crile and Lower have written a book which is issued as the second edition of their former work "Anoci-Association." The authors say in their preface that, "accumulating experience in the civilian clinic and in field and base hospitals in France has added so much corroborative evidence of the soundness of the fundamental principles of anoci-association and its practical application, that we have ventured to re-write and augment our former volume."

It is stated that the authors and their associates at the Lakeside Hospital have performed 12,382 abdominal operations, 9,424 before the use of anociation was inaugurated, and 2,958 under anociation. They state that the striking improvement in their results since the adoption of these methods furnishes them with the incentive to try and achieve a technique which will assure an even more complete anociation. They then proceed to describe a technique for abdominal operations in general, *i. e.*, first, that for the abdominal incision; then anociation and peritonitis; anociation in acute and chronic appendicitis; in operations on the stomach, or the gall-bladder and ducts; acute cholecystitis; in operations on the intestines (resection of the intestines) in operations for cancer of the rectum and colon; in gynecologic operations; in genito-urinary operations; in the treatment of exophthalmic goitre; in operations for cancer of the breast; in operations in the mouth and neck (cancer of the larynx); the relation of anociation to post-operative morbidity. There is a chapter on transfusion of the blood; another on anesthesia, and finally the book is concluded by a summary in which we have the statement that "the best *cure* of shock is *prevention*." The authors have purposely omitted a discussion of the many theories of the causation of shock and have confined themselves chiefly to that of the kinetic theory.

After each chapter describing the technique of special operations will be found a series of warnings under the headings of "Don'ts"; they refer to the conduct of the operation, and wrong things too often done even by men of experience.

The reviewer for a long time has been a firm believer in the anociation theorie of Crile, and in their application thinks that they represent the most progressive and useful work of any that we have before us today. The general purposes of surgery are to reduce morbidity, prolong lives, and make them happy and useful.

When a clinic of the standing of that at Lakeside can report, as they have since this book went to press, a further corroboration of the value of anociation in lessening the general mortality by 33⅓ per cent in a series of 13,145 laparotomies, the profession cannot afford to ignore the recommendations of Crile and his associates. JNO E. SUMMERS.

1918 COLLECTED PAPERS OF THE MAYO CLINIC, Rochester, Minn. Octavo of 1,196, pages, 442 illustrations. Philadelphia and London: W. B. Saunders Company, 1919. Cloth, $8.50 net.

This number, considerably larger than its immediate predecessor, contains numerous articles upon the alimentary canal; the uro-genital organs; the ductless glands; the heart; the blood; skin and syphilis; head, trunk and extremities; nerves, and ends with a series of useful papers upon technique.

As stated in a notice of a former number, these collected papers are too well known and appreciated to require more than calling attention to their publication, for they have long since won a high place in medical literature as representative of the best thought and work in sound progressive medicine.

Excluding the articles discussing subjects some of which have appeared in others of the Collected Papers, the reviewer believes that much practical information may be obtained from a careful reading of those on blood transfusion, by Pemberton and Hunt; the etiology of epidemic poliomyelitis, by Rosenow; the articles by New and Stacy on the use of radium, and that of Mann on experimental surgical shock. More particularly must be noted the beautiful work of Adson in surgery of the nervous system. JNO. E. SUMMERS.

THE AMEBAE LIVING IN MAN. A Zoological Monograph, by Clifford Dobell, M.A., F.R.S., New York: William Wood and Company, 1919. Illustrated. Pp. 155.

This work is a very good summary of our present knowledge regarding the amebae living in man. It is as the title states, a purely zoological monograph and, for that reason, will not be found of much value to the practicing physician, but to those members of the medical profession who are interested in the subject, especially to medical protozoologists and parasitologists, it will be of the greatest service and value.

The author divides the amebae living in man into four genera, a classification which it is probable very few protozoologists will accept, but his descriptions of the organisms are clear and while they add nothing new to our knowledge of the more important species, as *Endameba coli* and *Endameba histolytica*, the descriptions of *Endameba (Endolimax) nana* and of the two new species which he describes, *Iodameba bütschlii* and *Dientameba fragilis*, are real contributions to our knowledge regarding the parasitic amebae. However, it is doubtful if the author will be supported in his classification of these organisms by many authorities.

The author takes occasion in the text to refer several times in a slighting manner to the work accomplished in the study of the amebae living in man by "medical men." While, no doubt, many errors have been committed in the interpretation of certain phenomena connected with these parasites by medical men who have studied them, and who have not been professional protozoologists, it is doubtful whether as many important errors have been made by them as by the professional protozoologists who have worked with these organisms, and it is certainly true that had it not been for the interest taken in the amebae of man by medical men we would not have the fairly complete knowledge concerning them that we have. In this very work, the author emphasizes the many important mistakes that have been made by eminent protozoologists in describing these amebae, especially by Schaudinn, Hartmann, Prowazek, and others; mistakes that have confused the subject for years and greatly hindered progress in our knowledge, and if such errors are committed by men who have devoted their life to the study of the protozoa, the insignificant errors of medical men are of little consequence.

The author's *Iodameba buischlii* is an excellent illustration of the disagreement that exists even at the present time among professional protozoologists regarding the amebae living in man. Dobell, places this organism in a new genus, *Iodameba*, and thinks that its cysts are the common "iodine cysts" which have for so long been a puzzle to investigators. On the other hand, Kofoid, also an eminent protozoologist, believes that these "iodine cysts," when nucleated, are cysts of *Endameba nana*. If such disagreements exist among protozoologists, it would appear rather superfluous to call special attention to the mistakes of medical investigators, especially as medical observers have discovered every essential fact connected with the development and relation to disease of the more important amebae living in man.

Too much of the work is devoted to controversial material and the author's tendency to belittle the observations of those with whom he is not in agreement and his sometimes sarcastic comments upon their work, greatly mar what would otherwise be a model scientific monograph. However, the book is well worth reading and will prove of practical value to those especially interested in the subject. It is well printed upon excellent paper and the plates illustrating the test, though somewhat diagramatic, are very good. Photomicrographs of the various amebae described would have added greatly to the value of the work.

CHAS. F. CRAIG.

THE TREATMENT OF SYPHILIS, by H. Sheridan Baketel, A.M., M.D. New York: The Macmillan Company, 1920. Pp. 167. Illustrated.

This book, as the author states in his preface, is "intended for those physicians who have not heretofore employed the intravenous method of injection (of arsphenamine) or those whose acquaintance therewith is limited" and it well fulfills the purpose for which it was written. The history and chemistry of arsphenamine and neoarsphenamine are fully considered and the chemotherapy of the arsenic compounds, together with the indications, contraindications and efficiency of both of these most valuable agents in the treatment of syphilis. However, the chief value of the book lies in its detailed directions regarding the preparation of arsphenamine and neoarsphenamine for administration and the very excellent descriptions of the methods of administering these drugs. It is safe to say that had the profession been acquainted with the detailed methods of administration mentioned in this work many of the unfortunate accidents which have followed intravenous and intramuscular injection of the most valuable agents that we possess in the treatment of syphilis would not have occurred. The reviewer takes pleasure in recommending Dr. Baketel's work to all who are interested in the treatment of this disease, believing that if the instructions which it contains are followed carefully greater success and efficiency will result from treatment not only with arsphenamine and neoarsphenamine but with the mercurials, the methods of the administration of which the author also fully considers.

The work is well illustrated and the illustrations will be found most useful in following the technique recommended by the author. The press-work is excellent and the paper and binding all that could be desired. CHAS. F. CRAIG.

TEXT-BOOK OF DERMATOLOGY. by J. Darier, with notes by S. Pollitzer. Philadelphia and New York: Lea & Febiger, 1920. Price $8.50.

Those who desire to specialize in dermatology and who have not decided upon their choice of a text-book should become thoroughly familiar with this work—it teaches dermatology. For the specialist who is accustomed to the old arrangement of the classical treatises, it will not appeal to him as a reference book. If the index is consulted it will be found that lesions of syphilis occupy pages from 41 to 632 and other subjects are similarly located.

Skin diseases are in this work studied according to their morphological states thus enabling the student and the physician engaged in general practice to understand and study the eruptive conditions found in the pathology of the dermatoses.

The author's long habit of teaching that lesions should be studied in relation to their anatomical structures is strongly emphasized throughout the book. Under therapeutic notes treatment is suggested according to etiological factors and pathological states and to avoid endless repetitions the prescriptions are confined to the end of the volume.

The book is well illustrated with 204 engravings and 4 colored plates. The former are reproduced from excellent photographs, the colored plates would be better uncolored. JAMES F. WALLACE,
Captain, M.C.

PATHOGENIC MICROÖRGANISMS, by Wm. Hallock Park, M.D., and Anna Wessels Williams, M.C., assisted by Chas. Krumwiede, Jr., M.D. Seventh Edition, enlarged and revised. 214 Engravings, 9 full page plates. Philadelphia, New York: Lea & Febiger, 1920. Pp. 786. Price $6.00.

It is unnecessary to say that a work which has passed through six editions has fulfilled the purpose for which it was written. The present edition is considerably enlarged and contains new sections upon the hydrogen-ion concentration, on streptococci, yeasts, and upon the influenza bacilli. Considerable material has been added to nearly every chapter in the book which has notably increased its value. The chapters upon technique are especially full of material of practical value to the laboratory worker, while the descriptions of the various pathogenic bacteria are all that could be desired.

The section upon protozoa by Williams is well up to date but like all chapters on this subject incorporated in a volume devoted mostly to bacteriology, the treatment of the subject is inadequate. The reviewer is not in sympathy with the incorporation in a work of bacteriology of a section devoted to protozoa as invariably the latter subject suffers because of the lack of space to consider it *in extenso*. The parasitic protozoa known at the present time are so important that they demand separate consideration and a proper consideration cannot be contained within the space that can be alloted in a work of this character. However, the discussion of the protozoa in this work is excellent, although greatly condensed for reason of lack of sufficient space. The book is well printed and bound and remarkably free from typographical errors. It can be recommended to the general practitioner and student as one of the best works upon the subject in the English language.

CHAS. F. CRAIG.

THE MICROBIOLOGY AND MICROANALYSIS OF FOODS, by Albert Schneider, M.D., Ph.D. (Columbia University), Professor of Pharmacognosy, College of Pharmacy, University of Nebraska. Fellow of the American Association for the Advancement of Science; Formerly Microanalyst in the California State Food Laboratory; Formerly Microanalyst in the U. S. Bureau of Chemistry; Consulting Microanalyst and Bacteriologist; Member of the Volunteer Medical Reserve Corps. Philadelphia: P. Blakiston's Son & Co. Price $3.50.

This book of 256 pages is intended to serve as a guide and manual for food inspectors and analysts working in the field, and more particularly for those working with the military forces. The book is well written and contains a number of good illustrations. The author discusses the changes that take place in the various stages of decomposition of food products, the agents that cause such decomposition, the technique of the general and special methods of food and water analysis in the field, and the micro-analytical rating of food materials. He has also included a chapter on the legal standards of purity for food products.

The writer emphasizes the importance of the organoleptic tests and the direct microscopical examinations for the detection of impurities and evidence of deterioration in food materials. In the opinion of the reviewer, the value of the book would have been increased by a more complete discussion of the indirect methods of food analysis. In time of war, food inspectors would, in most instances, have access to a well equipped laboratory and would be able to use the indirect methods of analysis. Nevertheless, this book will be of value to those who must make food examinations at isolated stations situated at a distance from the laboratories.

GEORGE C. DUNHAM.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will made for review in the interest of our readers and as space permits.

THE MAINTENANCE OF PEACE, by S. G. Vestal, Colonel, 339th Field Artillery, National Army. New York and London: G. P. Putnam's Sons, 1920.

REGIONAL ANESTHESIA, by B. Sherwood-Dunn, Officier d'Academie; Surgeon (Colonel) Service de Sante Militaire de Paris; Physician to the Coohin Hospital. Philadelphia and London: F. A. Davis Company, 1920. Price $3.50 net.

A DIABETIC MANUAL, by Elliott P. Joslin, M.D. Illustrated. Second Edition. Philadelphia and New York: Lea & Febiger, 1919. Price $1.75.

SYMPTOMS IN THE DIAGNOSIS OF DISEASE, by Hobart Amory Hare, M.D., B.Sc. Eighth Edition. Illustrated with 195 engravings and 9 plates. Philadelphia and New York: Lea & Febiger, 1920. Price $6.00.

THE
MILITARY SURGEON
Vol. XLVII AUGUST, 1920 Number 2

DELOUSING THE AMERICAN ARMY IN FRANCE

By Colonel H. L. GILCHRIST[1]
Medical Corps, United States Army

AT THE time the armistice was signed, our armies, like those of our Allies, were heavily infested with lice and to such a degree that their condition was alarming. From reports to the Chief Surgeon of the A. E. F. by sanitary inspectors and others, it was noted that over 90 per cent of the troops were in a verminous condition. Considering that typhus fever was prevalent in many of the areas occupied by our troops, the condition was serious and one requiring immediate action.

Inasmuch as the work pertaining to bathing and delousing was assigned to the Quartermaster Corps, all activities pertaining to it were carried on through that department. However, a large percentage of the personnel performing the work belonged to the Medical Department.

The subject of bathing and delousing was closely associated with that of the "demustardization" of men subjected to the fumes of mustard gas. The Chemical Warfare Service, through its Medical Director, had perfected a thorough organization for administerin ghot baths to men at the front who had been subjected to the fumes of mustard gas, and in view of the fact that this organization would no longer function after the signing of the armistice, it was recommended by the Chief Surgeon of the A. E. F., the Chief Quartermaster, and by the Chief of the Chemical Warfare Service, that this organization be transferred to the Quartermaster Corps, for the purpose of bathing and delousing the infested men. This project was approved by the Commander-in-Chief and as a result the entire organization was assigned to the Quartermaster Corps. The transfer took place November 25, 1918, and the author, then the Medical Director of the Chemical Warfare Service of the A. E. F., was placed in charge of all activities pertaining to the work.

ESTABLISHMENT OF BATHING AND DELOUSING DIVISION

The Bathing and Delousing Division was established in compliance with the following memorandum:

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[1] Formerly Chief, Bathing-Delousing Division, U. S. Army in France.

November 21, 1918.

Commanding General, S. O. S.
C. in C.

Delousing and Bathing.

1. The health of the troops largely depends upon the completeness with which delousing and bathing is done, especially during the coming period of diminished activity and relatively permanent station.

2. Up to the present, the work of providing facilities for the cleanliness of the men's clothes and bodies has not produced satisfactory result. Much hospitalization from skin infections, as well as loss of health from minor maladies secondary to infections with vermin, has resulted. In some organizations as many as 90 per cent of the command are lousy.

3. Apart from the loss of physical fitness due to lice infestion and scabies, there is the danger of typhus fever which is now imminent. This results from the disintegration of the Armies of the Central Powers, whose delousing systems have up to the present time been a valuable barrier of protection for the Allied Armies against infection from the great eastern endemic centers of this disease. Winter is the season of typhus fever and of trench fever, both transmitted by the louse. Scabies is always more prevalent in winter.

4. The Chemical Warfare Service has developed under the direction of its Medical Director, Col. H. L. Gilchrist, a Degassing Service, with an efficient organization and trained personnel. This service could be most efficiently applied to the work of delousing.

5. It is recommended, therefore, that the attached draft of a General Order, be published, detailing Col. H. L. Gilchrist to this duty, under the direction of the Chief Quartermaster. The Chief Quartermaster, the Chief Surgeon and the Chief of the Chemical Warfare Service are in accord with this action.

6. It is requested that such instructions be issued to the Armies as will enable Colonel Gilchrist to carry on this work, and that copies of such instructions be furnished him.

J. G. HARBORD,
Major General, U. S. Army, Commanding.

In compliance with the above recommendation the following General Order was issued:

G. H. Q.
AMERICAN EXPEDITIONARY FORCES

General Orders
No. 216.

FRANCE, *November* 2, 1918.

II

1. The health of the troops depends largely upon the completeness with which delousing and bathing is done, especially during the coming period of diminished activity and relatively permanent stations.

2. To provide for the carrying on of this important work, Col. H. L. Gilchrist, Medical Corps, is hereby detailed for duty, under the Chief Quartermaster, and placed in charge of all activities with reference to the delousing of the armies.

3. The equipment and personnel of the Degassing Service is attached to the Quartermaster Corps. This equipment and personnel, together with that now in operation under the Salvage Service, will be placed at the disposal of Colonel Gilchrist for this work.

4. Such part of Sec. 7, G. O., No. 144, these Headquarters and all orders and instructions heretofore issued which conflict with the above are rescinded.

By Command of General Pershing:

James W. McAndrews,
Chief of Staff.

Official:
Robert C. Davis,
Adjutant General.

In compliance with the above General Order, the Degassing Service, consisting of the following personnel, was transferred from the Medical Department to the Quartermaster Corps in connection with this work:

COMMISSIONED	
Colonels, Medical Corps	1
Majors, Medical Corps	7
Captains, Medical Corps	27
1st Lieutenants, Medical Corps	4
1st Lieutenants, Sanitary Corps	5
2nd Lieutenants, Sanitary Corps	15
Total commissioned	59
ENLISTED	
Sergeants, 1st Class, Medical Department	5
Sergeants, Medical Department	12
Corporals, Medical Department	3
Cooks, Medical Department	3
Privates, 1st Class, Medical Department	13
Privates, Medical Department	178
Total enlisted	214
Grand total personnel	273

ORGANIZATION BATHING AND DELOUSING DIVISION

To better comprehend the subject of the organization for bathing and delousing, attention is invited to the following plan which shows the scheme under which this work was carried on. The Central Office was in direct communication with every division, subdivision, etc., and it is believed this feature was most essential, in that it furnished a means by which the Chief of the Bathing and Delousing Division was in direct touch with all activities connected with the work. With this arrangement the transfer of personnel and equipment from one division to another organization less fortunate, was readily accomplished.

Trained officers, in the majority of cases medical officers, and designated as Supervisors of Bathing and Delousing were assigned with every division. In most cases these officers were former Division Medical Gas Officers who took with them their trained office personnel. Under plans emanating from the Central Office, these officers immediately organized their divisions, placing subsupervisors of bathing and delousing with all regiments, battalions and smaller organizations.

When the Division of Bathing and Delousing was organized, every endeavor was made to avoid burdening the supervisors with an undue amount of paperwork, etc. It was the plan to leave them free from such encumbrances thus permitting them to devote more time to the essential features connected with the work. However, certain information was needed in the Central Office, consequently, printed forms requiring only such information as was actually wanted, were supplied for the purpose.

The supervisors were held strictly accountable for the carrying on of the work in their divisions, and as a rule, they were not interfered with. As a result, they performed most efficient services.

In each division, a thorough system of bathing and delousing was organized, by which arrangements were made for the complete and thorough disinfestation of units at definite intervals, this plan proved to be of the utmost importance. Time tables were drawn up, and the periods and places at which various units were to be bathed and disinfested, were specified in orders.

As a rule, the units were deloused systematically either by companies or battalions, so that the men who were freed from lice could be kept together and not reinfested by men from other organizations awaiting disinfestation. In delousing the men great care was also exercised in the disinfestation of their belongings at the same time. This was a most important measure in combating the lice infestation. It was essential that all clothing, including service dress and underclothing, should be thoroughly and systematically disinfested. This required a certain amount of equipment which, in many cases, could not be provided. As a result, the troops were thrown on their own resources and improvised many ingenious and successful contrivances for carrying out the bathing and disinfestation projects.

For the prevention of reinfestation of troops freed from lice, the following preventive measures were universally adopted in all divisions:

1. The detection of men who were infested with lice.
2. The disinfestation of all clothing and bedding belonging to lice-infested men.
3. The cleaning of the men by bathing.
4. Cleansing of their billets or sleeping quarters.

The relative importance of these measures was realized. The early detection of lice-infested men was essential without which the rapid spread of lice would follow. As a result, periodical inspections of men to detect lice infestation were made, and when possible these inspections were conducted in the presence of commissioned officers.

In conducting this work, every attempt was made to gain the men's confidence in the matter, thus getting their assistance. The men, if suspecting infestation, were instructed to report immediately to the designated officer in charge of the work in their units, where they received every consideration.

As a result of this organization the bathing and delousing of troops of the A. E. F. was carried out very successfully and in less than six weeks after the Bathing and Delousing Division was created the lice infestation rate dropped from 90 per cent to less than 3 per cent, which was due to the methods already described, consisting of:

(*a*) Thorough organization.
(*b*) Education of troops in matters pertaining to lice.
(*c*) The combined efforts of officers and men.
(*d*) The coördination of all departments of the A. E. F.
(*e*) Individual efforts of the soldiers.
(*f*) Improved facilities for bathing and delousing.
(*g*) Propaganda.

DUTIES OF SUPERVISORS OF BATHING AND DELOUSING

The Supervisors of Bathing and Delousing were appointed upon the recommendation of the Chief of Bathing and Delousing Division of the A. E. F. In the majority of cases these officers were former Division Medical Gas Officers. They were placed in general charge of all bathing and delousing in the division or base to which assigned, and attached to the staff of the Division or Base Quartermaster. Owing to the close relationship existing between the Medical Department and the Quartermaster Corps in connection with the work, they coördinated in every possible way with these different departments.

They prepared for publication and distribution to all organizations in their division, extracts from reports and all other literature which had a direct bearing on the subject, forwarded to them by the Chief of Bathing and Delousing Division.

They gave numerous lectures to the different organizations on the subject of lice infestation.

They arranged for the regular inspections and supervised the same.

They furnished the Chief of Bathing and Delousing with all data having any bearing on the subject, together with all required reports.

MEASURES FOR ELIMINATION OF LICE

At the beginning of this work many adverse conditions were met, all of which had to be overcome. There was a scarcity of bathing and delousing equipment, and that on hand was not being utilized judiciously. Laundry facilities were poor; as a result, there was a shortage of underclothing. The troops were unsettled, they were constantly changing from one area to another, many were billetted in private homes and places which could not properly be disinfested. These were serious conditions which had to be eliminated before any improvement in the verminous condition could be looked for.

It was soon discovered that the thoroughness of ridding troops from lice depended upon its weakest link, for example, one organization was periodically disinfested and bathed, the Commanding Officer of the organization gave the matter his personal attention, regular schedules were followed, and everything was done to eliminate lice infestation. However, these efforts were unsuccessful, and lice were constantly being found. After a thorough investigation as to the cause, it was traced to the condition of the underclothing which, due to lack of proper laundry facilities, was not laundered at the same time; as a result, one man would have on clean underclothing and another in the same billet dirty, with the result that lice were being transferred from the dirty to the clean. When this condition was remedied the lice disappeared. Regularity in the changing of underclothing, proper bathing and disinfesting facilities, and the supervision of the work by a commissioned officer were found to be the predominating necessities for the successful elimination of lice.

In the carrying out of this work, two general methods of disinfestation were followed:

1. The mechanical method.
2. The chemical method.

Under the mechanical method the following equipment was used: steam sterilizers (mobile and stationary); steam boxes; serbian barrels; hot air disinfestors; Canadian hot air disinfestors; hot boxes; heated caves; flat irons; heated cans, etc.

Under the chemical method the following were used: Acetic acid, 10 per cent, or vinegar for headlice; alcohol, absolute, or strong spirit, for headlice or crabs; benzine for headlice and bodylice; benzol; camphorated alcohol—camphor one part in 90 per cent alcohol; camphorated oil; carbolic acid 2½ per cent followed by olive oil; cresol solution—5 per cent cresol soap solution killed nits and lice in 30 minutes—3 per cent killed in one hour; mercury for capitis, corporis and pubic; mercury ammoniated white precipitate ointment; mercury and vinegar; mercury one to two thousands; napthaline 96 parts, cresole 2 parts and iodoform 1 part—known as N. C. I.

DIFFERENT STYLES OF DISINFESTORS

Several different styles of steam disinfestors were employed in this work, and when handled with care proved successful. Much unjust criticism was made relative to the inefficiency of certain types of steam disinfestors, but after careful investigations it was found, in nearly all cases, the fault was not due to the apparatus but to other causes, generally to inexperienced personnel, overcrowding of the chambers and lack of proper exposure. At one camp, frequent complaints were made that live lice were found in clothing after having been sterilized. The matter was investigated when it was found ignorance was the cause of the trouble.

Serbian Barrels.—Serbian barrels and modifications of the same and in many cases ordinary steam boxes in which steam was generated in galvanized cans, etc., were used successfully.

In Germany several organizations used improvised steam disinfestor chambers constructed from large hogsheads, at one end of which a trap door had been prepared for admitting articles to be disinfested. Steam for the disinfesting was generated in gasoline bedons from which it was conveyed to the hogsheads in ¾-inch piping.

These were used quite extensively and built according to plans furnished from the Central Office. Many other different types of hot air disinfestors were constructed. Some of the simplest of which were those built in hillsides covered with galvanized iron roofing and then banked with dirt very much like charcoal ovens.

Flat irons, hot bottles, heated tomato cans and other contrivances were also used extensively and successfully.

Portable Hot Air Disinfestors.—The necessity for portable hot air disinfesting equipment soon became apparent. To meet these demands a portable hot air sterilizer and disinfestor was devised by the writer. It consisted of a sheet-iron asbestos-lined chamber 14 inches by 6 inches by 6 inches, heated by means of gasoline blow torches. The hot air being driven through a series of 6-inch piping arranged along the bottom of the chamber.

Movable racks were fitted at the top of the chamber. Each rack consisted of 34 cross beams or supports fitted with 14 hooks. The entire apparatus was mounted on a three-ton chassis.

The clothing and equipment of seventeen soldiers could be disinfested every half hour by this means.

Bathing Apparatus.—All sorts of bathing apparatuses were used by the troops, some stationary, many portable. The mobile bathing plants, description of which appears later in this article, proved highly successful. In view of the fact that they were motorized, they could move from one area to another in a short space of time thereby rendering efficient service in places void of other means.

PORTABLE BATHING AND DELOUSING COLUMNS IN THE BILLETTING AREAS

With the occupation of large numbers of men in the small towns in the vicinity of base sections and large concentration camps which were used for billetting purposes, the important question of adequate bathing facilities and means of disinfestation of clothing and equipment was presented. Local facilities for bathing were, as a rule, extremely meager and permanent shower baths were installed only in the larger towns. Thus the question of bathing and delousing the men occupying small villages remained to be met by some means of portable equipment.

The Chemical Warfare Service had already in use a type of portable bathing machine devised by its Medical Director. This machine was used to a great advantage in the work.

It consisted of a 1,200-gallon water tank mounted on a 5-ton truck with all necessary appliances for the administering of hot shower baths. The water was heated by a highly efficient instantaneous system attached to the rear of the tank. The heat was generated from a series of gasoline burners constructed in a circle with a preheating burner in the centre. A centrifugal pump was attached to the fly-wheel of the motor, thus making it possible to fill the tank in four minutes from a running stream, pond or shallow well.

Proper standards made from 1-inch tubing supporting a series of twenty-four shower heads were also attached to the truck and so arranged that the apparatus could be erected and put in operation in a very few minutes.

Ward hospital tents were also included with the equipment which were used in areas where other shelter could not be found. A detachment of four men was sufficient to operate the plant.

Bathing by roster was always insisted upon. If a medical officer was available each man was inspected for manifestation of scabies and body lice before taking the shower. Suspects were placed under observation for further examination and the necessary after treatment.

BATHING OF TROOPS AT BASE PORTS

At the signing of the armistice, troop movements to the United States commenced almost immediately. A large percentage of the men transported were verminous. As a result many complaints, and just ones, were received from the home ports. The condition became so serious that the Commanding General S. O. S. directed that no further troop movements be made until proper arrangements were provided for delousing prior to embarking on board ships. As a result every effort was made to provide, on short notice, delousing plants at each of the embarkation ports, sufficient in size to care for 10,000 troops in twenty-four hours.

After visiting the several base ports and carefully studying the situation it was decided the most feasible method for conducting the work and handling the large numbers which would have to be considered would be a division of all camps into two sections: (1) A reception or dirty section; (2) a clean or evacuation section. All troops arriving at the camp were assigned to the dirty section and retained until such time as they could be thoroughly deloused, after which they were transferred to the clean or evacuation section, a complete line of demarcation separating the camps. To carry out the plan required a large buildings and delousing plants, of sufficient size to handle the maximum number scheduled to pass through the camps. The plan was submitted to the commanding general of the S. O. S. and approved.

The next important matter for consideration was the type of delousing plant to be adopted. No plans of bathing and delousing plants of any description were available in the A. E. F.; as a result, drawings were prepared by the writer, submitted to the chief quartermaster and approved by the commanding general, who issued orders for their immediate construction.

In planning the delousing plant the following departments were decided upon as being necessary:

1. A general inspection of all clothing and equipment for the purpose of listing such articles as were missing, and for which others would be required.
2. The checking and compiling of all individual records.
3. The delousing of all clothing and equipment retained after passing the general inspection.
4. The venereal inspection.
5. Bathing.
6. Complete medical examination.
7. The reissuing of such articles of clothing as required.
8. Shaving of the hairy parts of the body when necessary.
9. Final dressing.

DESCRIPTION OF BATHING AND DELOUSING PLANTS

The approved bathing and delousing plants were 175 feet long, 85 feet wide and consisted of a main building with two projections or wings. The main building was 85 feet long, 55 feet wide and contained the Bathing, Medical Examination and Clothing Departments. The wings were 125 feet long and 38 feet wide running parallel to each other with an interval of 20 feet between. Each wing was divided into ten compartments and lettered from A to J with seats arranged on either side of each compartment for the accommodation of 15 men. Along the outer side of each wing and connecting with each compartment was a passageway 5 feet wide. On the floor of the compartments, and extending through the disinfecting chambers which were constructed in the space between the wings, were Decauville tracks for the transporting of movable racks. The racks were constructed of wood and mounted on small Decauville trucks. Each rack was 7 feet long and 3 feet wide, divided into sections containing hooks for hanging clothing, the racks being spaced to correspond with the seat numbers.

Hot Air Disinfesting Chambers.—The hot air disinfesting chambers were 120 feet long, 15 feet wide and 7 feet high, cemented floors, refrigerator walls with cinder packing. They were lined on both sides with corrugated iron, thereby making them practically fireproof. Double doors, each 4 feet wide and extending from floor to ceiling, were placed opposite each compartment for the entrance and exit of the movable racks. These chambers were numbered serially from 1 to 10.

Gasoline Heating.—Prior to the installation of steam pipes in the chambers the degree of heat was obtained from the gasoline heaters in design similar to those used on the mobile bathing plants. These heaters were placed in cement-lined cellars under the center of each series of chambers. This system was used as a temporary measure pending such time as permanent hot pipes could be installed. The principal objection to the method was: (1) Danger from live fire; (2) the air being a combustion product and low in oxygen had a tendency to leave the material fumigated with an obnoxious odor; (3) the dangers connected with overheating the ovens or chambers.

Plan of Operation.—When the plant was in operation 200 men reported every half hour. They were divided into platoons of 20 men each, each platoon being in charge of a noncommissioned officer who was designated as compartment chief.

The men were instructed by the compartment chief to proceed to certain stalls designated by capital letters and to numbered seats. At the same time each man's clothing slip was marked with the letter of the stall and the number of the seat to which he was assigned. The men were then instructed as to the method of disposing of their clothing, bathing, drawing of clean clothing, disposition of dirty, cast-off underclothing, and the designated places to await the complete delousing of their belongings.

Bath Room.—Those found free from venereal diseases in the first instance passed immediately into the bath room and were required to thoroughly soap their heads and hairy parts of the body and scrub themselves vigorously. Clean towels were provided each man. Liquid soap was used exclusively.

Medical Examination Room.—After the men dried themselves they passed in single file in front of a line of medical officers, each a specialist, where careful and complete examination of the throat, lungs, heart, skin, etc., was made.

Those found suffering from any serious disease were sent to the hospital for further examination, classification and treatment. In the medical examination careful inspection for vermin was made and those found infested were shaved, treated, and required to again thoroughly bathe, and report back for reëxamination. Those having skin diseases or any special interesting pathological conditions were classified and photographed.

Quartermaster Issue Room.—From the medical examination room the men passed to the clothing department where they presented their clothing slips and received clean underwear, socks, fresh identification tapes and such other equipment as had been checked off for them to draw.

Dressing Room.—With the new equipment in their arms the men then entered the dressing room and Final Inspection Department where they were directed to compartments and seat numbers corresponding with those occupied in the undressing sections. Their clothing and equipment remained in the hot oven or disinfestor for a period of 30 minutes. While waiting for the clothing to be disinfested they put on the clean clothing drawn. When the rack bearing their clothing was shoved out in their sections they hurriedly removed all their belongings thus permitting the rack to be shoved back in the undressing sections for the receipt of clothing of others. Each checker in charge of the different sections or compartments called off the articles which each man was supposed to have. Shortages were reported and filled.

If a delay of over three days existed after the troops were deloused prior to embarkation they were again sent through the mill for reëxamination.

REPORT OF ACTIVITIES OF BATHING AND DELOUSING AMERICAN EMBARKATION CENTER AT LE MANS

1. The bathing and delousing division, American Embarkation Center, at Le Mans, was organized and operated as follows:

(*a*) One officer known as Supervisor, Bathing and Delousing, American Embarkation Center, who was responsible for the installation, operation, and administration of adequate bathing and delousing facilities for the entire area.

(*b*) One officer responsible for the repairs and proper maintenance of all bathing and delousing apparatus in the embarkation area.

(*c*) One officer responsible for the inspection of all equipment, and the reporting of needed repairs to the Maintenance Officer.

(*d*) One Personnel Officer and Statistical Officer, in charge of reports and matters relating to the personnel.

2. Under the direction of the supervisor, there were supervisors for the Concentration Camps, *i. e.*, Forwarding Camp, Belgian Camp and Classification Camp, and for the following districts: Montfort, Le Ferte Bernard, Le Theil, Ecommoy, LeSuze, Ballon and Conlie.

3. Large bathing and delousing plants were installed at the Forwarding Camp, Belgian Camp and Classification Camp, with combined facilities for bathing and delousing approximately 1,200 men per hour. In addition to these plants, bath-houses were erected, with sufficient capacity to bathe those not infested with lice.

4. For convenience of troops billeted in the city of Le Mans, an excellent French bath-house, with a capacity of 600 baths per day, was leased and operated.

5. Throughout the billeting area, in the towns occupied by troops, or within easy marching distance, portable 8-head shower baths were installed in tents, French buildings or in bath-houses especially constructed by the engineers. Each bath had a capacity for bathing about 300 to 400 men per day. Where practicable, French bath-houses were taken over for the use of the troops.

6. The area delousing was accomplished by means of portable Erie, Thresh and Grampian sterilizers, by improvised Serbian barrels, by pressing clothes with hot flat irons, by boiling the underclothing, by the use of disinfecting fluids such as cresol, and by other various available means. The sterilizers were capable of disinfecting 50 complete kits per hour, and were moved about in much the same manner as the Mobile Bath Units described below.

7. There were seven Mobile Bath Units, each with 24 shower heads, and each capable of bathing 300 men per hour. These were moved through the area according to the fluctuation of its population, thus relieving any congestion that might occur.

8. In order to carry on this work, a permanent personnel of 17 officers, including those before mentioned, and 175 enlisted men, was maintained, and when necessary, additional men were detailed to assist in this work, from the troops occupying the Divisional Area.

STEAM DISINFECTING PLANTS AT LE MANS

Description of the Plant.—The plans of the disinfesting and bathing buildings at LeMans were similar to those at the base ports but mucn smaller. The hot air method of heating the disinfesting chambers first tried was abandoned in favor of steam at low pressure. At each of these plants six small steam chambers were constructed each 15 feet long, 6 feet wide and 6 feet high and made from tongue and grooved stuff on the outside and lined with asbestos boards. At each end of the chambers were double doors, each door of double thickness and lined with asbestos boards. Loosely fitted racks were provided in the upper part of the chambers for the reception of the articles. Steam was introduced in the chambers from two ¾-inch pipes connected to an 85-horse-power boiler. The pipes entered each chamber from a supply pipe where it extended along the outer edge of the floor. These pipes were perforated with small holes at intervals of 6 inches for the escape of steam.

Hot air for drying purposes was driven into the chambers through 6-inch pipes extending under the floor, by means of a fan propelled by a 15-horse-power motor. The air was heated in a brick fireplace constructed just to the rear of the chambers. Trap doors 4 feet in diameter were provided at the top of the chambers for the escape of steam, when the hot air was introduced. A steam exhaust 2 inches in diameter was placed in the corner of each chamber. This pipe extended through the roof and down to within 6 inches of the floor.

At a trial test, one of the chambers was filled to its capacity with the entire equipment of 15 men, which consisted of the following articles: cap, overseas; overcoat; coat, service; belt, waist; gloves; breeches, service; puttees; tags, identification; helmet; haversack and pack-carrier; belt, cartridge or pistol; canteen cover; first aid pouch; gas mask haversack; comb; sterilizable souvenirs; blankets, three.

At this test the following experiments were also conducted: a bottle filled with tapped water of a temperature of 6° C. was placed in the pocket of a blouse in the center of the chamber; a potato which was covered with several thicknesses of overcoat stuff was placed in the pocket of another blouse; two puttees were rolled up into a tight ball and hung in the chamber. At this test the chamber was not preheated, but steam was immediately turned in and allowed to exhaust for 15 minutes. During this time several outside temperatures were taken at the upper part of the exhaust on the outside leading to the chamber: In 1½ minutes after the steam was turned on the exhaust registered 60° C.; in 2 minutes 70° C.; in 4 minutes 85° C.; in 5 minutes 90° C.; in 6 minutes 94° C.; in 7 minutes 99° C.; in 9 minutes 99° C. The thermometer seemed to retain this temperature throughout the entire test.

A close study was also made as to the effect of this steam on the pressure on the boiler. The steam was taken from a large 85-

horse-power boiler, which was also furnishing power for several steam disinfestors, running laundry machines, etc. When the steam was turned on the pressure gauge registered 57. This gradually dropped down to 40, but again ascended to 46, showing a drop of 11 pounds during the test of 15 minutes. After turning off the steam the trap-doors at the center of the chamber was opened up and the hot air driven in which continued for 10 minutes, at the termination of which the doors were opened.

It might also be stated that a leather shoe was hung in the chamber to see what effect the steam would have on this material. A test was also made concerning the shrinkage qualities by using a web belt for this purpose and noticing if clip cases would be effected. The shoe was badly shriveled up and in like condition following any steam disinfestation. No apparent shrinkage was noticed in the web belt and other equipment. All articles were apparently dry. The temperature of the water in the bottle, which before entering the chamber was 6° C., was found to be 85° C.; the potato was boiled for 3/8 of an inch and 3 minutes after it had been taken from the chamber the center of the potato registered 60° C. The puttees were unrolled and found steaming in the center.

PERSONNEL ATTACHED TO EACH LARGE BATHING PLANT

At each large bathing plant a permanent operating staff of 7 commissioned officers, 25 noncommissioned officers and 175 privates was constantly required to carry on the work. This staff was divided into squads, thus permitting the plant to run continuously when required.

MEDICAL PERSONNEL ATTACHED TO THE LARGE BATHING AND DELOUSING PLANTS

To insure a thorough physical examination of all men prior to embarking for the United States, a large medical staff with personnel was required at the plants at Bordeaux, St. Nazaire and Brest. Twenty-two medical officers were detailed at each plant for this work. They were divided into three shifts, each shift working eight hours. A permanent medical detachment consisting of 30 enlisted men acted as clerks and other capacities required in this one department. In carrying on this work a laboratory was provided in which dark fields were done on all penile sores, urethral smears were stained for gonococcus, etc.

FIRE PROTECTION AT LARGE BATHING AND DELOUSING PLANTS

1. Always a detail of fire-guards on duty.
2. Water barrels and fire buckets always filled.

3. Abundance of Pyrene fire extinguishers, small and large.
4. Steam jets extending into ovens operated by valves outside of ovens, whereby ovens can readily be filled with live steam.
5. Daily inspections of fire-fighting apparatus, drills, etc.
5. Plenty of fire exits.
7. Fire hose and water faucet within easy reach.

SANITATION

The handling of so much clothing and equipment on the floor, especially in the disrobing room, results in much dust, dirt and litter. This was removed by sweeping by special details, in the interval of time between the exit of one assignment of men to a stall and the entrance of the next. To keep down dust which was considered especially dangerous under these conditions, the floors were sprinkled with sawdust wet with cresol solution and every two hours the floors are sprinkled with a 7 per cent cresol solution. A knapsack sprayer is found especially useful for that purpose.

CRITICISM OF HOT AIR APPARATUS

Although there was much criticism relative to the efficiency of hot air as a means of killing lice, the working of the plants at Bordeaux and St. Nazaire proved completely the efficiency of this method if carried out with care.

PROPAGANDA

This work was of such importance that a special department was created in the Central Office with branches throughout all divisions, each in charge of specially qualified men.

A comprehensive campaign of education concerning lice, their habits and their relation to health was started at the beginning of the work. In conducting this campaign many different methods were used in distributing information concerning this subject. The matter was also taken up with organizations, where memoranda on the subject were read at all formations, to the men.

Thousands of large circulars and charts were also posted throughout division areas and in places where men congregated.

The cimematograph proved of the greatest importance in distributing information. To gain the interests of the men cartoons were thrown on the screen showing the lice, their habits and their relation to the soldier, as well as facts and figures. This method of distributing information proved of the greatest value.

In the entire scheme of propaganda every effort was made to solicit the coöperation of the men.

CLEANLINESS OF BILLETS

One cause for the constant presence of lice on men was the fact that the billets were infested. To overcome this, it was recommended that whenever possible extemporized bedsteads or canvas cots be provided for the men and bed sacks used instead of loose straw. The floors of the billets and other places in which lice were found were washed or sprayed with a 10 per cent solution of cresote in water.

In segregation camps the following was carried out:

(*a*) Cities selected afforded tent accommodations for twice the number of men for segregation.

(*b*) All camps, irrespective of size, were divided into two sections: (1) Dirty or reception camps; (2) clean and evacuation camps.

(*c*) Ample facilities provided for baths and means of disinfesting by heat or some sort of disinfesting chamber.

(*d*) The enforcement of measures for preventing communication between the infested men and the noninfested.

(*e*) The daily inspection of all men for signs of lice.

TABULATED TABLES SHOWING MAXIMUM PERSONNEL EQUIPMENT, MEN BATHED AND GENERAL OPERATIONS

In the following tables an attempt is made to show in tabulated form, the number of officers and enlisted men actually engaged in delousing and bathing; also the bathing facilities where numbers of men bathed in 5 months, during which records were kept and total number of articles disinfested. It will be observed that over 6,000,000 baths were administered and over 10,000,000 articles of clothing disinfested during the five months in the different divisions.

At Bordeaux, over 1,000,000 men were bathed and 4,000,000 articles of clothing disinfested.

At St. Nazaire, 800,000 men were bathed and 4,000,000 articles of clothing disinfested.

At Le Mans, 2,200,000 men were bathed and 4,000,000 articles of clothing disinfested.

At Brest, 1,300,000 men were bathed and 3,000,000 articles of clothing disinfested.

Total throughout the divisions, Le Mans and base ports of 11,300,000 men bathed and 25,000,000 articles of clothing disinfested.

DIVISIONS

PERSONNEL

Officers	242
Enlisted men	1,336

BATHING FACILITIES

Stationary baths	739
Portable baths	304
Mobile baths	14
Total number shower heads	15,853
Men bathed (approximately five months)	6,000,000

DISINFESTING FACILITIES

Stationary steam sterilizers	52
Horse-drawn steam sterilizers	233
Improvised steam sterilizers	437
Improvised hot air sterilizers	121
Number articles disinfested (10 days)	1,304,000
Number articles disinfested (5 months)	10,000,000

BORDEAUX

PERSONNEL

Officers	24
Enlisted men	561

BATHING FACILITIES

Stationary baths	30
Mobile baths	2
Shower heads	1,048
Men bathed (10 days)	92,060
Men bathed (5 months)	1,000,000

DISINFESTING FACILITIES

Stationary steam sterilizers	3
Horse-drawn steam sterilizers	5
Improvised steam sterilizers	20
Large plant sterilizers	1
Number articles disinfested (10 days)	385,773
Number articles disinfested (5 months)	4,000,000

ST. NAZAIRE

PERSONNEL

Officers	17
Enlisted men	197

BATHING FACILITIES

Stationary baths	1
Shower heads	149
Men bathed (10 days)	36,246
Men bathed (5 months)	800,000

DISINFESTING FACILITIES

Stationary steam sterilizers	6
Horse-drawn steam sterilizers	12
Hot air sterilizers	4
Large plant sterilizers	1
Articles disinfested (10 days)	325,000
Articles disinfested (5 months)	4,000,000

LE MANS

PERSONNEL

Officers	12
Enlisted men	362

BATHING FACILITIES

Stationary baths	11
Mobile baths	7
Shower heads	1,482
Men bathed (approximately 5 months)	2,200,000

DISINFESTING FACILITIES

Stationary steam sterilizers	5
Horse-drawn steam sterilizers	13
Large plant sterilizers	3
Articles disinfested (10 days)	335,000
Articles disinfested (5 months)	4,000,000

BREST

PERSONNEL

Officers	20
Enlisted men	553

BATHING FACILITIES

Stationary baths	15
Mobile baths	0
Shower heads	664
Men bathed (5 months)	1,300,304

DISINFESTING FACILITIES

Stationary steam sterilizers	2
Horse-drawn steam sterilizers	20
Large plant sterilizers	1
Articles disinfested (10 days)	200,000
Articles disinfested (5 months)	3,000,000

RECAPITULATION

PERSONNEL

Officers	315
Enlisted men	3,009

BATHING FACILITIES

Stationary baths	796
Portable baths	304
Mobile baths	23
Number shower heads	19,196
Men bathed	11,300,000

DISINFESTING FACILITIES

Stationary steam sterilizers	[2] 68
Horse-drawn steam sterilizers	283
Improvised steam sterilizers	582
Large plant sterilizers	6
Articles disinfested	[3] 25,000,000

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[2] Does not include disinfestors employed in salvage work.

[3] Included are registered activities only. Does not include activities not scheduled.

BATHING ALONE FOR ELIMINATION OF LICE

After carefully studying the entire subject of bathing and delousing, I am convinced that lice can be eliminated entirely by the use of plenty of soap and water and issuing of clean underclothing. Although no opportunity was given for making a careful study of the situation, it is believed that lousy men can be completely deloused in five weeks time by the administration of weekly hot baths and clean changes of underclothing and clean billets. It was found that over 70 per cent of the lice were on the body and underclothing alone, and considering the life history and habits of the body louse, it is believed the above mentioned method, if carried out carefully, would completely eliminate lice infestation.

GENERAL SUMMARY AND PRACTICAL RECOMMENDATIONS

1. The subject of bathing and delousing is so closely allied with personal cleanliness and general sanitation that it is believed it should be handled by the Medical Department. Although the work connected with the delousing and bathing of troops of the A. E. F. was done under the direction of the Quartermaster Corps, all activities connected with it were done by officers and enlisted men of the Medical Department. All supervisors of bathing and delousing of divisions, together with general supervisors of the work in the large mobilization and concentration camps were medical officers.

2. It is believed the first step in combatting lousiness is to teach the individual what lice are and to impress upon him the harm they can do. He should also be taught simple means by which they can be eliminated.

3. The seriousness of lousiness should be realized by all officers in command of troops and unremittant attention given by them in the examination of all members of their command, for without their personal supervision the work will not be accomplished. Along these lines the following should be closedly followed:

(*a*) The detention of men who are infested with lice.

(*b*) The immediate disinfestation of all clothing and bedding belonging to the man infested with lice.

(*c*) The cleanliness of the man himself, bathing.

(*d*) The cleanliness of his billet.

In conclusion, many interesting lines of thought have been suggested in connection with this work and as a result, many new phases of the subject have been introduced. It was clearly demonstrated that, allowing the enlisted men to share a part of the responsibility for the success or the failure of an enterprise, met with marked success

It was also demonstrated that soldiers, when thrown on their own resources, would provide methods to bridge impassable gulfs; as a result, in carrying out this work many ingenious contrivances were made by the soldiers, without which the delousing and bathing could not have been accomplished.

There remains only the facts, figures and impressions of the pleasant memories of the close association with the officers and men of the American Expeditionary Forces, who at all times endeavored to assist in every possible way the accomplishment of this work.

TRAINING DOWN

By Colonel ROBERT M. CULLER, A.M., M.D., F.A.C.S.
Medical Corps, United States Army

THIS discussion is intended for the encouragement of those who hold the common belief that the highest degree of mental and physical fitness can be attained only by a training down process, consisting of fatiguing and exhausting exercises, unpleasant restrictions in the matter of food and drink and the suppression of normal human desires in general. This idea is strong enough among all classes of people to make them neglect their bodies until such time as loss of health, strength or pulchritude forces them to subject themselves to rules and regimen invented by ignorant ring heroes, pseudo scientific faddists, dietary specialists and purveyors of apparatus for the cultivation of health, strength and beauty.

It is an amazing thing that physicians, charging themselves with the care of the human body, know so little about it, and by their indifference and ignorance permit what should be one of their important functions to be exercised by graduates from the prize ring and other persons uneducated in all manners pertaining to the well being of the body. Were it not pitiable, it would be ludicrous to watch a party of middle-aged or elderly men "muldooning" around in a gymnasium, pale and exhausted, trying to get the better of their embonpoint, obeying the harsh commands of their "trainer," who knows nothing of any human body, not even his own. These obese old fellows will submit to a discipline attended by fatigue, exhaustion and even torture with the same indefatigable spirit which possesses the female searcher for youth and beauty when she submits to any kind of abuse at the hands of a beauty specialist. The young aspirant for ring honors begins to train down when a match is made for him; growing school boys train down for their competitive sports; society women train down and reduce in anticipation of a successful social season. All of these people seem to realize that these efforts are directed to the correction of faults in their habits of living, without knowing that many of the defects from which they suffer can only be corrected by training up, instead of down. Retrograde physical changes, brought about by injudicious training-down processes, constitute definite intrinsic losses in strength, such losses being expressed in terms of decrease in body weight and vigor, nervous irritability or in real pathological states such as auto-intoxication due to rapid uneliminated tissue waste, cardiac dilatation or any of its concomitants.

Attempts to train down and reduce are usually accompanied by absurd dietary restrictions and abstinence from articles of food ordinarily considered essential, together with limitations in drinks of all kinds, even including water. If any benefit can be derived from these fatiguing and restrictive methods, the system might then be applicable and appropriate in the case of troops facing an enemy. If fatigue, exhaustion and abstinence make physical fitness and vigor, soldiers should be trained down and reduced in order to make them attack the enemy with dash and courage or to maintain a defensive position with a sustaining patience. On the contrary, even the general public knows that troops are trained upwards and that well-fed and rested troops are strong in battle and that a collective increase in weight among soldiers is indicative of and synonymous with fitness, both from the standpoint of nervous energy and muscular power. It has been known from earliest times that well-fed and rested troops are effective against a starved and fatigued enemy. The meaning of the saying that "an army marches on its belly" is known to every schoolboy. In all history we read of no one advocating restriction of the normal appetite in soldiers preparing for combat, because it has been proven a thousand times that the physical and mental powers of men, singly or *en masse*, are expressed in direct proportion to their nutrient intake. Those who had the privilege of observing the best French troops during the World War will recall their appearance of high nutrition and their lusty bearing. No troops ever attacked an enemy with greater abandon and impetuosity, and none ever sustained a defensive action with more stolid fortitude. French troops were constantly trained up, by athletic and military exercises, with generous amounts of food and wine and subjected to so few repressive influences that their high morale was maintained during many dark periods.

The lack of food and drink among many peoples and nations today brings with it all the miseries, for the alleviation of which money and supplies are being constantly solicited. In the light of these well-known facts, it is hard to conceive how the idea is kept alive that health, vigor and preservation of youth and beauty can come from doing without something in the way of food and drink. People believe that health comes in some mysterious way to those who deprive themselves of something they like. "I don't smoke and I don't drink" has too often been mistakenly construed to denote mental and physical competency in an individual boasting of his abstinence, aside from the high moral values attributed to him. This slogan of abstemiousness has led many people to conclude that the highest mental and physical competency is incompatable with the enjoyment of the good things of life.

I would like to convince these people that man's highest potentialities for health and strength are derived from a sane enjoyment of the pleasures of life, provided the mind and body are required to do enough work, and that the negative virtues may belong to the least productive and worthless men among us. Overwork, either mental or physical, is almost impossible; that is to say, a man cannot do more of either kind of work than he can bear, provided his nutrient intake is in a direct proportion to his expenditure of energy, and provided his life is balanced between the two kinds of labor which are complementary to each other. At the same time, no man can tax his mental makeup, including his psychic apparatus, beyond certain limits, unless the nutrition of his physical body is kept up by proper food and enough labor to maintain metabolism. It is possible, however, to keep up to a high point of mental health while performing the most laborious and sustained physical work, since the activities of the mind cannot be put in abeyance in the same manner as those of the body; therefore the risks of bad effect on the mental forces by disuse are slight compared to the dual bad effect upon the mind and body by neglect in maintaining the equilibrium of the physique by proper labor.

There have been some notable instances of success in athletic sports by men whose reputation was gained not only by their prowess but through their disregard for the conventional deprivation methods of training. John L. Sullivan enjoyed himself, yet he was a ring champion the like of which has never been seen, because he ate and drank and *worked* and put upon his great muscles a layer of subcutaneous fat which not only protected him from injury but formed a reserve to be burned up during long fights, thus preventing waste in more vital tissue. His habits of life were conducive to happiness, contentment and freedom from that irritability of temper which often is born out of deprivation and repression. Louis Cyr, a Frenchman, held the world's record for formal weight lifting at the age of 52 years; he was considered fat and "refused to train," but he bested all competitors over a period of years. Frank Gotch had a lot of subcutaneous fat evenly distributed over one of the fittest bodies ever seen on a mat; his whole career was a period of training up instead of down. No admirer of Doctor Roller, another notable athlete in several lines of sport, will believe that training down is essential for success, because this famous man ate and drank what pleased him best and enjoyed himself in all legitimate ways. All the above mentioned enlightened athletes no doubt viewed with satisfaction the training-down processes which weakened their prospective antagonists. Were I to engage in a contest, either mental or physical, I would be encouraged by the hope of success in proportion to the manner in which my prospective opponent deprived himself of creature comforts and exhausted himself by fatiguing exercises. While the training down and reduction in weight of a jockey may favorably influence the chances of a race horse, it must be borne in mind that the horse has to run the race and not the jockey.

Many oarsmen reduce their weight at the expense of their strength and endurance in order to make the boat load lighter, but the best all-round oarsmen in the world are Englishmen, who care very little for their weight limit, for they eat, drink and smoke but work hard for form, skill and endurance. I am of the opinion that, while reducing methods do lessen the load the boat has to carry, the collective bad influences of all kinds of deprivations incident to injudicious training down tell against success in long races requiring sustained effort.

The inhibitions, repressions and anxieties incident to striving for efficiency in all lines of human activity often cheat men out of that happiness and contentment which should constitute an important aim in life. It does not need a psychiatrist to point out the evil consequence of repressions and restrictions upon normal desires, whether these are self-imposed through ignorance or for conscience sake, or whether they are imposed by some powerful individual, or whether they are imposed by statutes established by a mistaken majority. The tendency of all men to desire to be mentally and physically fit will make them subscribe to any proposition, however erroneous, purporting to contribute towards it; this fact accounts for the common opinion that deprivation is good for us and a fulfillment of normal desires is bad for us, since no one ever says anything to the contrary, for fear of being considered immoral or licentious.

The human body has great potential strength which is seldom developed to its highest expression. During the arboreal period of human existence, the musculature of the body was entirely devoted to the difficult acquirement of food and to defensive and offensive battles incident to it. From this period on down to the present, the necessity for general physical effort has given place to specialized physical effort to gain a livelihood, through the general gain in intelligence and the invention and evolution of tools, machinery and other labor-saving devices. Indeed these tools and machines, together with the possibility of living without physical labor, by the exercise of the mind alone, has caused a demand on the part of the body for work which finds expression in recreative exercise. This takes the form of games, sports, contests and the like. It is in this field that the physician has neglected his opportunity to learn important matters connected with the needs of the human body for exercise, the kind and amount to be taken, with a consideration of age, type and sex of the individual, habits of life and all other circumstances which must govern a man in forming an opinion. The average doctor, while recognizing the almost universal need for physical work in the maintenance of health, usually prescribes this work by the simple formula "take exercise," leaving the details either to the choice and inclination of the individual or else allowing him to seek the advice of "trainers," wholly uneducated in matters pertaining to the functions of the body.

It cannot fall within the scope of this discursive article to even outline appropriate physical exercise and work necessary for the well-being of the mind and body, but it is enough to say that the closer the form of exercise resembles productive labor, the less likely are we to overdo it. It is a misfortune that the energy expended upon recreative exercises and sports cannot be translated into productive labor during this period of underproduction. I believe that productive manual labor might be the salvation of many worn-out, inadequate brain workers could they be persuaded to undertake it. One is inclined to think that sawing wood is not the most foolish thing in the life of William Hohenzollern.

MEDICAL ACTIVITIES OF THE AMERICAN EXPEDITIONARY FORCES IN THE ZONE OF THE ARMIES[1]

By Colonel A. N. STARK
Medical Corps, United States Army

AFTER a period of intensive training, on January 15, 1918, the 1st U. S. Division relieved the French Moroccan Corps in the sector north of Toul between the St. Mihiel salient and the Moselle River, this being the official entry of the American troops into combat. Evacuation Hospital No. 1 was installed February 1, 1918, in the Sebastopol barracks 3 miles north of Toul in the middle of the sector, marking the first front line hospitalization attempted, this unit being 25 kilometers in rear of the trench line.

The 2d, 26th, and 42d Divisions were placed in relatively quiet sectors for instruction in trench warfare under French command, and Evacuation Hospital No. 2 was established at Baccarat and Mobile Hospital No. 39 at Aulnois sous Vertuzey to increase the hospitalization.

The 1st Division was relieved by the 26th on April 3, 1918, and after a brief period of rest was transported to the neighborhood of Montdidier where on April 25 it occupied a section of trenches, its hospitalization under agreement with the French authorities being provided for by the Army Red Cross Hospital at Beauvais.

The German offensive beginning on March 21, 1918, thrusts were made with success against the line north of Montdidier held by the British, and suddenly changing his objective the enemy drove a wide and deep salient in the line held by the French between the Aisne and Marne rivers, the greatest advance being made in May in the direction of Paris.

That part of the French line to which the 1st Division had been assigned offered a stubborn resistance which foiled the patent effort of the enemy to divide the British and French junction, and consequently he redoubled his efforts between the Aisne and Marne and forced the French across the Marne, his best divisions being employed here in great numerical superiority to the French who wisely refrained from throwing in their reserve as it was not definitely determined at this time that the drive in the direction of Paris was the main enemy objective, as great preparations had been reported at other points on the long line.

The 2d Division had been transferred from its area to the neighborhood of Chaumont-en-Vixen, near the location of the 1st Division, with the intention of its relieving the latter which had sustained and successfully repelled numerous assaults in great force.

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[1] This article was written Feb. 21, 1919.

On May 28, 1918, the 28th Regiment of Infantry of the 1st Division made a brilliant and successful surprise assault upon the strongly fortified village of Cantigny which it held, and this action caused the enemy to make 12 assaults in mass against the 1st Division, which were repulsed with great losses to the enemy, the Americans tenaciously holding the ground gained.

The losses sustained by the 1st Division in this conflict were as follows:

	Officers	*Men*
Killed	13	186
Wounded	31	621
Captured or missing	1	15

5 enemy officers and 220 men were captured.

From this time on the conflict became general from the North Sea to Verdun, and the German thrust in the direction of Paris by way of Chateau-Thierry had attained such magnitude no room was left for doubt as to his intentions.

The outlook was decidedly gloomy as all efforts to check the advance in this direction appeared futile, and acting in his capacity as Commander-in-Chief of the Allied Forces, General Foch on May 30, 1918, ordered the transfer of the 2d Division to the vicinity of Meaux, where the first elements arrived on May 31. The 3d Division had also been ordered to this point by train and truck, and the 26th Division was preparing to move to this sector.

The 7th Machine Gun Battalion of the 3d Division arriving in trucks on the morning of June 1 was barely in time to take up position at the bridge-head at Chateau-Thierry, and though without previous combat experience, it made such a magnificent defense against overwhelming forces flushed with victory it checked the crossing of the enemy at the main avenue of approach, suffering a loss of half its effectives in a few hours, but enabling the elements of the 2d Division to advance and take up position across the Paris-Metz highway, and for the elements of the 3d Division that had arrived in the meantime to make preparations for entrance into what was to prove a most sanguinary conflict, but also the crucial point of the war which was to mark the high-water line of the German flood, and the ebb of his fortunes that ultimately stranded him upon the reef of defeat.

The 2d Division, after a desperate struggle against some of the picked German divisions, succeeded in effecting a crossing of the Marne, being ably supported by the 3d Division and 6th French Army, and thrusting the enemy back engaged in the conflict upon the wooded heights above the Marne which will be known in history as the battle of Belleau Wood.

At this point the troops of the 2d Division displayed a courage and indifference to overwhelming odds that will ever add increased luster to American arms, for these splendid troops engaged the flower of the Prussian Guard and not only inflicted grievous losses but pressed the enemy back.

What has been said of the 2d Division is equally true of the 3d, for this latter had not had the advantage of training under fire, and therefore its participation in one of the most sanguinary conflicts of history, in which the troops bore themselves with a dash that was magnificent, is all the more praiseworthy.

For one who was present at this anxious time it is not an exaggeration to say that this battle saved Paris and opened the eyes of the enemy and the world to the fighting qualities of the American troops, elevating the spirits of the Allies and depressing those of the enemy who had believed victory to be well within his grasp.

The confusion created by the rapid advance of the enemy in the direction of Paris had affected the entire country, the railroads probably more than other institutions, and this with the paucity of motor truck transportation made it practically impossible to transport evacuation hospitals to the scene, or to have hospital trains approach near enough to the battle area to be of use. It had been specifically agreed in writing that American troops operating under French command would receive hospitalization at the French institutions, but the demoralization consequent upon the German advance precluded the use of these institutions, and after triage and redressing, the seriously wounded and gassed were moved by ambulance from the field hospitals to the hospital at Jouilly maintained by Mrs. Harry Payne Whitney for French aviators, the less severely wounded and gassed being transported by ambulance to the five Army Red Cross hospitals in Paris over a poor road of 65 kilometers in length, adding to the shock in spite of the warm weather, though it was the only recourse of the American command confronted by insurmountable obstacles and a total lack of transportation facilities at this time. The medical officers of these divisions performed prodigies in caring for the sick, gassed, and wounded, but human endeavor could not move hospitals at this period of utter demoralization and abeyance in transportation, and while some suffering was caused it must be remembered that the actual conditions in war do not admit always of the nice adjustment of theories formulated in peace, and also that the lesson learned here is additional argument for the Medical Department to possess some motor transportation of its own by which its evacuation hospitals can be shifted as occasion demands.

The German advance having been stopped, desultory fighting with small losses occurred daily.

By dint of great effort, Evacuation Hospital No. 7 was established at Chateau Montanglaust near Coulommiers the first part of June, where it was joined several days later by Mobile Hospital No. 1, both affording a bed capacity of 1,100 with good hospital train evacuation facilities, and at this time the Army Red Cross established a hospital at Jouy-sur-Morin with a capacity of 800 beds, its train evacuations being effected at La Ferte Gauche 4 kilometers distant.

These hospitals with Jouilly sufficed for the troops engaged at this time in the sector and performed remarkable work.

To coördinate the control and supply of the American divisions in this sector an Assistant Chief of Staff, G-4, was established at La Ferte sous Jouarre, and an advanced depot placed at Lieusaint southeast of Paris and regulated through Le Bourget.

It had become evident to the French High Command that the enemy though checked at the Marne would make other attempts at some unexpected point, and signs of activity being reported in the vicinity of both Soissons and Chalons, the 2d Division was withdrawn from near Chateau-Thierry and with the 1st Divisior placed in reserve under the 10th French Army south of Soissons, and the 42d Division was established in support of the 4th French Army at Suippes north of Chalons, these dispositions being made the first week in July.

Evacuation Hospital No. 4 was established at Ecury and Mobile Hospital No. 2 at Vatry, both for service with the 42d Division, and Evacuation Hospital No. 5 was designated for service with the 1st and 2d Divisions, its postponed arrival being due to the declination of the French to permit an American hospital in the area of the 10th French Army as the French agreement to hospitalize our wounded was evidently deemed sufficient.

During this time the 26th and 28th Divisions had arrived in the Marne sector and their control with the 3d was vested in the Commanding General of the First Army Corps, A. E. F., under the 6th French Army, while the 1st, 2d, and 4th Divisions were under the Commanding General of the 3d Army Corps, A. E. F., attached to the 10th French Army.

On the night of July 14–15, 1918, after a terrific artillery preparation, the German Army opposed to the 4th French Army north of Chalons attempted a violent thrust with the rail center of Chalons as the objective, and though the 42d Division was in support it speedily engaged in a struggle with the enemy who had advanced rapidly under cover of his barrage, and at one time during that eventful night found itself surrounded on three sides, its admirable handling however enabling it to not only check the enemy but inflict heavy losses upon him with relatively slight loss to the Americans. The losses sustained in that combat are as follows:

	Officers	*Men*
Killed	4	305
Wounded	3	990
Gassed	..	225
Captured or missing	1	30

This division remained on the defensive till July 23 when it was transferred to the Marne.

On July 15, 1918, the enemy made a heavy thrust in the direction of Paris to the south of Soissons, between the Aisne and Marne Rivers, and early on the morning of the 18th the 1st and 2d Divisions of the 3d Corps, held in support to the 10th French Army near Crepy, were cast into action, and by the fierceness of their onslaught not only drove a deep salient but checked the enemy advancing in mass and inflicted severe losses, at the same time suffering heavy losses, which were as follows:

1ST DIVISION	*Officers*	*Men*
Killed	74	1,178
Wounded	193	4,678
Captured	15	1,528
Enemy prisoners taken	125	3,375

2D DIVISION	*Officers*	*Men*
Killed	29	452
Wounded	121	2,572
Captured and missing	4	764
Enemy prisoners taken	66	2,879

The failure of some one to inform either the A. C. of S. G-4 at La Ferte or G. H. Q. of the imminence of combat, coupled with the declination of the French command to admit American hospitalization to this area (which declination would have been unheeded had the proper authorities received the warning that should have been given, and was withheld for reasons of secrecy that were absurd at such a juncture) prevented Evacuation Hospital No. 5 en route to this area from arriving on the scene in time to be of much service, and the French hospitalization was so inadequate it did not suffice for the care of the French casualties.

As Paris was but a short distance from the scene of battle hospital trains were rushed to Crepy where the wounded and gassed, after receiving such care as the field hospitals afforded, were loaded into comfortable trains and speeded as preoperative cases to the five Army Red Cross Hospitals in Paris for definitive treatment.

Evacuation Hospital No. 5 having been rushed to Sery Magneval, near Crepy, on the earnest plea of those who had denied it admittance, only received the nontransportable cases, but its presence proved a godsend to a Scotch division rushed in to relieve the 1st and 2d Divisions with such haste its sanitary train was left far behind, necessitating the loan to it of the greatly fatigued sanitary train of the 1st Division which transported the wounded of this gallant division to Evacuation Hospital No. 5 for definitive treatment, from which location all were evacuated to Senlis, freeing this hospital for further service or relocation.

This experience proved the last attempt for months to brigade American with French troops, and the 32d, 42d, and 77th Divisions having arrived in the Marne sector, these and the divisions mentioned beforehand were concentrated on the general line of the Marne under the 1st and 3d American Corps with elements of the 6th French Army incorporated, all being under the coördinating control of the A. C. of S. G-4 representing G. H. Q., this groupe of divisions being known as the Paris Groupe.

During this period Evacuation Hospital No. 8 had arrived at Jouilly, Evacuation Hospital No. 6 at Chateau Perrouse near La Ferte, Evacuation Hospital No. 4 at Meaux, and Mobile Hospital No. 2 at Chateau La Trousse near Lizy-sur-Ourcq Luzancy, Evacuation Hospital No. 5 at Sery Magneval being packed for a move when the 1st and 2d Divisions joined the other American divisions.

From July 20 to August 10, the American and French divisions had forced the German troops nearly to the Vesle River in the direction of the Chemin des Dames, inflicting heavy losses upon the best divisions the enemy could muster in an effort to check the steady progress of the French and American Armies which was creating a tremendous effect upon the German populace who had received information in spite of the activities of the censors.

The First Army, A. E. F., was officially announced on August 10, 1918, with the Commander-in-Chief in command, auxiliary troops were added, and the American Army began the independent career it maintained to the end.

The arrival of heavy Army artillery before the organization of the First Army enabled the divisions to leap-frog each other and present a fresh division to the greatly fatigued enemy, who by the middle of August retired behind the Vesle enabling the French Armies on the right near Rheims and on the left near Soissons to converge to a point with the Chemin des Dames as the centre.

When the American First Army had advanced 30 kilometers north of the Marne, Evacuation Hospitals 5 and 6, with the Army Red Cross

Hospital No. 107 from Jouy and Mobile Hospital No. 1 from Montanglaust, were established at Chateau-Thierry and its suburbs on August 1, and on August 9 Evacuation Hospital No. 4, Mobile Hospital No. 2, and Army Red Cross Hospital No. 110 from Beauvais were installed at Coincy, half way between Soissons and Chateau-Thierry, both points possessing good rail facilities for hospital train evacuation and easy access from the front. Evacuation Hospital No. 3 arrived on August 3, and after following the troops with tentative location for several days was finally established at Crezancy near the Chateau-Thierry-Rheims road on August 12.

The German having withdrawn towards the Aisne River and the Chemin des Dames, his progress being accelerated by the French Armies on the left and right, the First American Army was withdrawn to the Neufchateau area for preparation for the next offensive, the 32d and 77th Divisions remaining to assist the 10th French Army in pushing in the salient created in the region east of Soissons, upon the successful completion of which they withdrew on August 30 to join the other American divisions in the new area.

Evacuation Hospital No. 5 had been moved to Villers-Cotterets to hospitalize the wounded of the 32d and 77th Divisions, and the other evacuation, Army Red Cross, and mobile hospitals were placed in rest in the new area.

During the first part of August a singular diarrhea had afflicted all in the Marne country, French, Americans, Germans, and French civilians alike, this diarrhea being without tenesmus or temperature and the mortality nil. Sanitarians deemed it a fly borne disease of dysenteric nature, for the entire country was infested with myriads of flies. At this time the bread supplied left much to be desired, for being baked by the flash method in large loaves the interior was raw dough in lumps and the loaves were permeated with mould.

The laboratories made numerous cultures and obtained all the known bacteria that may flourish in the intestinal canal with the exception of cholera and typhoid, and this process required such a long time without any specific organism being implicated the troops had all withdrawn from the sector.

As a similar disease made its appearance in the Second American Army months later, when the cold weather had destroyed all flies, we are still in the dark as to the nature of the disease which, if dysenteric in type, is without doubt the mildest and most singular manifestation of the disease that the world has known, and it is but fair to term it camp diarrhea of unknown origin, as the water supply was not implicated.

The casualties in the Aisne-Marne offensive from June 1 to August 30, 1918, in the various combats described are as follows:

Killed	6,054
Wounded	40,974
Sick	9,032
Gassed	3,808

On August 16, 1918, the Staff of the First Army, A. E. F., began preparations for the reduction of the St. Mihiel salient based upon the battle order, the date of the offensive being unannounced and speed enjoined.

The battle order announced that 10 American divisions with corps and army troops reinforced by French heavy artillery would assail the line north of Toul from Richecourt to Nomeny, the II French Colonial Corps would attack at the point of the salient after the American line had advanced to the first phase objective line with the mission of "mopping up" the forest that was located in this region, and that four American divisions, reinforced by heavy French artillery, would attack south of Verdun at a point opposite Les Eparges, the objectives being attained in 3 phases of a day's duration each. The 4th Corps, A. E. F., was assigned that portion of the line north of Toul between Richecourt and Limey; the 1st Corps, A. E. F., the line from Limey to Nomeny, the right flank division being astride the Moselle River and to act as a holding force; the II French Colonial Corps the point and both sides of the salient and in contact with the American forces on the east and north; the 4 American divisions between Les Eparges and the II French Colonial Corps holding the line from just south of Verdun under the 5th Corps, A. E. F.; Army Headquarters to be located at Ligny-en-Barrois which was the nearest available point to the three sectors of the line.

The battle order was subsequently altered to assign one division (26th) to attack at Les Eparges, the other three in this sector being in reserve, and added two divisions as Army reserves behind the 4th and 1st American Corps. This disposition of forces necessitated a triple hospitalization, and to that end sanitary formations were secured from the French Department of Armies of the East which with the units to function them are as follows:

Verdun or Western Front.—Souilly, Evacuation Hospitals Nos. 6 and 7 Petit Maujouy, near Ancemont, Evacuation Hospital No. 8; Vaubecourt, Evacuation Hospital No. 9; La Morlette, Mobile Hospital No. 1; Recourt, Mobile Hospital No. 2; Rambluzin for a gas hospital to be functioned by Field Hospital No. 108; Benoite Vaux for a neurological hospital to be functioned by a unit from Base Hospital 117, half of the formation being for contagious cases and under French control; and 2,200 beds for overflow in the French General Hospital at Bar-le-Duc.

II French Colonial Corps Front.—Pierrefitte, Loxeville, Menil La Horgne, Lignieres, Commercy, Void, and Vaucouleurs, these formations being already functioned by French units.

Toul or Southern Front.—Sorcy, Evacuation Hospital No. 11 and Field Hospital No. 41 (Army); Pagny-sur-Meuse, Evacuation Hospital No. 12 and personnel of Field Hospital No. 117; Trondes, Mobile Hospital No. 4 and Field Hospital No. 161, 1st Corps, acting as reservoir for Mobile 4; Perrin Brichambault Barracks, Toul, Evacuation Hospital No. 14; Justice Groupe of Barracks, Toul, Evacuation Hospital No. 3 and Gas Hospital to be functioned by mixed personnel from Base Hospital No. 45 and Orthopedic Training Battalion under Gas Officer of Evacuation Hospital No. 2; Justice Barracks No. 1, Toul, Base Hospital 51; La Marche Barracks, Toul, Base Hospital No. 45; Luxembourg Barracks, Toul, Army Red Cross Hospital No. 114; Chaligny, Evacuation Hospital No. 13 and Field Hospital No. 162, 1st Corps, assisting; and La Malgrange, near Nancy, Field Hospital No. 163, 1st Corps, acting as Evacuation Hospital.

Evacuation Hospital No. 1 and Mobile Hospital No. 39 were already functioning at Sebastopol Barracks and Aulnois sous Vertuzey, and Mobile Hospital No. 3 was assigned to Sebastopol Barracks, and a neurological unit from Base Hospital No. 117 was installed in a small barrack of the Justice Groupe, as was also Convalescent Unit No. 1 for care for infectious cases. The necessary transfers of these units with the accompanying ambulance companies were made promptly and all were in a position of readiness on September 10, 1918. Medical Supply Parks were established at the La Marche Barracks, Toul, and at Souilly.

It having been estimated the three-phase offensive would net 33,000 casualties, 45 hospital trains were obtained from the French which with the 17 American Trains and 15,000 beds in the Toul sector, 6,000 in the French II Colonial Corps sector, and 4,500 in the Verdun Sector were deemed sufficient to dispose of the estimated number of casualties and sick expected from the 490,000 men engaged. Hospital trains were to be regulated through the Regulating Office at St. Dizier.

The triple nature of the hospitalization and evacuation demanded three representatives, one at Toul, one at Souilly, and the surgeon of the II French Colonial Corps at Erize, while the Chief Surgeon of the Army was located at Neufchateau on the main telephone trunk lines to coördinate the activities on all fronts and insure supply.

In the early hours of September 12, 1918, after two hours of the most terrific artillery preparation the world had known to that time the barrage lifted, and in a dense fog the First American Army advanced in its maiden independent effort to achieve a victory so completely and quickly accomplished that the world at large was astounded, the enemy being surprised and overwhelmed in spite of his futile and frantic denial in an effort to minimize the effects of the disaster upon the already suspicious and demoralized German public.

The advance was so rapid the three-phase objective was lost to view, the troops making practically unopposed progress as fast and as far as a line may advance in one day and maintain contact with all the elements and with the Services of Supply, till at the ultimate line it halted at command and repulsed the repeated assaults of the enemy who had rushed up divisions in an effort to check the American advance before the objective which gave domination of the Metz basin could be attained. While the main conflict occupied only one day and part of another, the official period is from September 12-16, 1918, the latter part being largely artillery exchange.

The relatively small number of casualties sustained in this offensive in proportion to the number engaged is as follows:

TOUL FRONT

Wounded, including 303 German prisoners	3,446
Gassed	532
Neurological cases (shell shock)	147
Total	4,125
Died from wounds	104
Evacuations, including large number of sick in hospital at beginning of offensive	6,539
Number of hospital trains used	17

II FRENCH COLONIAL CORPS

Wounded, including 98 German prisoners	321
Gassed	0
Neurological cases	0
Total	321
Died from wounds	32
Evacuations	0

VERDUN FRONT

Wounded	625
Gassed	4
Neurological cases	135
Total	764
Died from wounds	22
Evacuations	725
Number of hospital trains used	5

The rapid advance with slight casualties did not warrant the moving forward of evacuation hospitals, and the entire number of sick, gassed, and wounded men could have been provided for in the hospitals at the front had it not been that uncertainty of further offensive tactics counselled the freeing of these hospitals for possible battle use.

An experiment was made in this offensive to determine the effectiveness of employing psychiatrists at the divisional triages and shell-shock hospitals at the front, and when it is considered that out of a total of 282 cases 225 or 79 per cent were returned to the front line within 3 days, the success of this employment must be manifest as it precludes a wastage in man power from which one of our allies suffered greatly.

In this offensive the use of a field hospital in each division in line to act as a triage or sorting station was given full scope, and this use which had been tentative in the Marne offensive was so successful that the dressing station and station for slightly wounded were found superfluous, as this sorting station well to the front took the place of both in open combat.

Superstition had through four years of trench warfare invested the heavily armed German fortification on Mont Sec with dreadful powers of destruction, and the 1st Division had been assigned the seemingly forlorn hope of taking this place with the expectation of so many casualties Mobile Hospital No. 39 at Aulnois sous Vertuzey had been allotted to the severely wounded of this division alone, while the slightly wounded were assigned to Evacuation Hospital No. 11, with Field Hospital No. 41 at Sorcy.

The right flank division on the Toul front being exposed to direct fire from the north and cross fire from the east was assigned Evacuation Hospital No. 13 at Chaligny for severely wounded, and Field Hospital No. 163, acting as an evacuation hospital, at La Malgrange for slightly wounded. The interior divisions shared the other evacuation, mobile, and base hospitals in relation to the corps and divisional lines of separation, and all shared in the gas, contagious, and neurological hospitals in the Justice Barracks.

The casualties sustained in this offensive, exclusive of wounded German prisoners, were as follows:

Killed[2]	769
Wounded	4,294
Gassed	532
Neurological cases	282
Total	5,877
Died from wounds	158
Enemy prisoners captured	14,400

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[2] Subject to revision.

This offensive emphasized the shortage in evacuation hospitals, medical personnel, and ambulances, this lack of balance between the combatant and medical organizations having been repeatedly notified to the War Department by the Chief Surgeon of the American Expeditionary Forces without result.

At this period the Medical Service of the A. E. F. was short 60,000 personnel, hundreds of ambulances, and many evacuation hospitals, this lack necessitating the adoption of dangerous expedients, such as the use of nonmedical personnel, field hospitals for evacuation hospital service, and the borrowing of ambulances from the French and from American base hospitals to the detriment of both, the robbing of divisions in training and base hospitals of surgeons, and the depletion of base hospitals of nurses and enlisted men, till nearly all the resources of the Medical Department of the A. E. F. had been placed at the disposal of the First Army and still did not suffice.

While the St. Mihiel offensive was in progress the First Army Staff made preparations for an offensive upon a much larger scale to be staged in the Argonne-Meuse sector from the western border of the Argonne Forest to the line held by the French northeast of Verdun, the objective being interruption of the enemy's main artery of rail communication between Mezieres and Longuyon and forcing him back on his vital pivotal flank, the successful attainment of this operation insuring his rapid withdrawal from the territory north of this point to the North Sea.

With the knowledge that the enemy had added largely to the natural defenses in this very difficult terrain and would exert himself to the utmost to prevent his pivot being forced, it behooved the First Army Staff to assemble a sufficiently large force to always present fresh divisions to combat the picked divisions the enemy would hurl against the Americans regardless of losses, and to so supply that force it could continue the offensive unremittingly. To this end the 1st, 5th, and 3d Corps of the First Army, with the 17th French Corps reinforced by two American divisions, comprising 25 divisions in all, corps and army troops, army reserves, and auxiliaries being added, all to the number of nearly a million men, were assigned to station in this sector with a front of 22 kilometers, the headquarters remaining at Ligny en Barrois with an advanced post of command at Souilly.

As September 26, 1918, had been designated as the day of beginning the offensive it became a herculean task to transfer the troops necessary in addition to the divisions already in the area, for participation in the St. Mihiel offensive, and to assemble the supplies and units, and this latter task demanded personal reconnaissance of the terrain by the chiefs of services on the First Army Staff.

The French authorities had already assigned certain formations to the Medical Service of the First Army for the St. Mihiel offensive and other formations in addition were taken over, the units to function them and the locations themselves being as follows:

La Grange aux Bois, Mobile Hospital No. 4; Brizeaux Forestiers, Evacuation Hospital No. 11; Villers Daucourt, Evacuation Hospital No. 14, Army Red Cross Hospital No. 110, and Army Field Hospital No. 41; Revigny, Base Hospital No. 83 and Evacuation Hospital No. 15; Nubecourt, Neurological Unit No. 3; Fleury, Army Red Cross Hospital No. 114 and Evacuation Hospital No. 3; Froidos, Evacuation Hospital No. 10; Chateau Salvange, Mobile Hospital No. 2; Les Placys, Mobile Hospital No. 5; Clair Chenes, Mobile Hospital No. 1; Ville Cousances, Evacuation Hospital No. 5; Julvecourt, Gas Hospital functioned by mixed personnel; Fontaine Routon, Evacuation Hospital No. 4, Evacuation Hospitals Nos. 6 and 7 at Souilly, No. 8 at Petit Maujouy, No. 9 at Vaubocourt, and Field Hospital No. 108 at the Gas Hospital at Rambluzin, with those mentioned above, afforded a front hospitalization of 18,000, far too small for the force engaged, but representing the full resources of the Medical Department at that time. Evacuation Hospitals Nos. 1, 2, 12, 13, and Mobile Hospitals Nos. 3 and 39 remaining in the Toul sector to serve the 4th and newly formed 6th Corps.

These units were placed as near railway sidings as possible and expanded to their fullest capacity, being served by ambulance companies, and the assignment to the corps sectors for severely and slightly wounded, gassed, and sick being according to corps lines, each corps having an equal number, except the 17th French Corps which was to be a holding force at first, its sick and wounded to be cared for in existing French units.

The 1st and 5th Corps had contagious hospitals run as annexes of the nearest evacuation hospitals and functioned by their personnel, the 3d Corps being served by the existing French unit at Benoite Vaux.

Large well-stocked medical supply parks were established at Vaubecourt and Fleury, the existing park at Souilly being enlarged.

Hospital Trains were garaged in numbers as near the front as possible, their movements being directed by the Regulating Office at St. Dizier.

The ambulance shortage being acute 15 sections of the U. S. A. A. S. of 12 cars each were obtained from the Italian Government, 9 French Sanitary Sections of 15 cars each, and 30 sightseeing 'buses with a seating capacity of 30 per car, were obtained from the French Government, and the total number of ambulances equably apportioned, the shortage still being 750 for an Army of the size to be employed in spite of tables of organization prepared and issued as a standard for transportation.

The battle order contemplated three phases, the objective being a ridge dominating the railway from Sedan on both sides, the French 4th and 5th Armies to the west in the Champagne Sector attacking simultaneously, and the 4th French Army and the 1st Corps of the American First Army to make contact at the head of the Argonne Forest.

As secrecy was essential to success all movements were made at night, the lowering weather precluding aerial observation by day, and on September 25th all was in readiness.

In the early hours of September 26, 1918, the earth trembled with an unprecedented barrage from 4,000 field guns, said by observers to be the heaviest ever delivered on any field of battle, the roar being so terrific the spoken command was futile during its continuance. As dawn came the dense masses of American Infantry moved forward across No Man's Land and forced the enemy over the most difficult and heavily wooded country to be found in France, except in the impassable Vosges Mountains, the absence of roads and the mud consequent upon the downpour of the preceding week making progress slow for foot troops and almost impossible for horse drawn vehicles and motors.

The enemy had massed machine guns in every thicket and at the head of every ravine, this being more pronounced in the Argonne Forest than elsewhere, for he had vast stores in the Forest and had made elaborate preparations for defense by wire entanglements 500 feet in depth, behind which the machine gunners were entrenched. Progress on the Forest side was therefore slow, and the casualties severe, while the 5th Corps made progress with difficulty up the slope of Montfaucon, and the 3d Corps on the right advanced rapidly in comparison.

But one road, Varennes to Grand Pre, skirted the Forest on the east, and below Varennes the enemy had employed ground mines so successfully the artillery and supply columns could with difficulty move at all, this delaying the advance at this part of the line until the engineers by superhuman effort built a by-pass and filled in the huge excavations. The middle sector assigned the 5th Corps had practically no roads, requiring oblique movement from either the 1st or 3d Corps sectors, and the first portion of the road in the 3d Corps sector from Avincourt to Malincourt was indescribably deep in mud, all this contributing greatly to delay the advance, and making the passage of the ambulances with wounded en route to the evacuation hospitals a stupendous task which was accomplished solely by the persistence of the splendid drivers and the great aid of the Military Police, for this passage the first day was made in the darkness of a rainy night.

The reduction of the Forest not being accomplished on the schedule of the battle order nor the heights of Montfaucon taken, fresh divisions were assigned the tasks, and to the 1st Division fell the Forest, the most difficult undertaking that or any other division ever attempted. Thoroughly accomplished in all forms of combat and still fatigued from the St. Mihiel offensive and its long journey on foot to this new sector, this splendid division took up its task in a business-like manner, and by dint of hard and almost guerrilla fighting conquered the Forest, inflicting severe losses upon the enemy and capturing many prisoners and much booty, but suffering heavily itself for it came out with an infantry strength of 2,200.

The remainder of the 1st, and the 5th and 3d Corps had advanced, and the roads being repaired and the congestion reduced, the time had arrived to advance some of the evacuation hospitals to shorten the haul for the wounded.

On October 1, Evacuation Hospitals Nos. 3 and 5 were transported from the area to Mont Frenet and La Veuve, respectively, to serve the 2d and 36th Divisions that had been detached from the First American Army for service with the 4th French Army in the Champagne sector north of Chalons, their ambulance companies accompanying them. Mobile Hospital No. 7 from Paris also arrived at Mont Frenet. Evacuation Hospital No. 14 was moved from Villers Daucourt to Les Islettes on October 7th, and Mobile Hospital No. 1 from Clair Chenes to Fromereville on October 9th.

Between October 1 and 7 the personnel of Evacuation Hospitals Nos. 20, 22, and 23 arrived and were distributed among the other hospitals which were being taxed to their utmost.

The 2d Division, supposed to be in support of the 4th French Army north of Chalons, was used to breach the line on October 3, which it accomplished with its usual dash, being relieved by the 36th Division on October 8, this use of these troops continuing until October 12 when both divisions withdrew and rejoined the First American Army, the casualties sustained in this local combat being given later under the total for the Argonne-Meuse offensive. After evacuation of patients Evacuation Hospital No. 3 returned to the First Army, arriving at Fontaine Routon on November 10. Mobile Hospital No. 7 was transferred to the Second Army, and Evacuation Hospital No. 5 proceeded to Dunkirk to join Mobile Hospitals Nos. 8 and 9 for service with the 37th and 91st Divisions detached from the Second and First Armies respectively, and to operate under French command.

On October 12 the 4th and 6th Corps with Army and Corps troops, and Evacuation Hospitals Nos. 1, 2, 12, and 13, with Mobile Hospitals Nos. 3 and 39, were detached from the First Army and assigned to the Second Army which came into being on that date, under the command of Lieutenant General Bullard, the Commander-in-Chief relinquishing the First Army to Lieutenant General Liggett. The Second Army acting as a holding force, and never being required for offensive tactics, no further mention is made of this splendid force that had been created for an offensive between Metz and Strasbourg.

Evacuation Hospital No. 15 moved from Revigny on October 12 and established at the Glorieux of Verdun to care for the wounded of the 3rd Corps, and assist in caring for the wounded of the 17th French Corps that had begun the offensive to the east of the Moselle.

It had become clear that evacuation by any road straight through the 5th Corps sector was impossible, and that oblique evacuation to the 1st and 3rd Corps sectors was the sole way to get the wounded out, and though it violated an established principle, nature made the land before man formulated the principle, and terrain always governs war.

At this time the wave of influenza that was sweeping over the continent engulfed the First Army that already had as much to bear as it could sustain, and for a time it appeared as though its ravages would seriously affect the military operations by overwhelming the sanitary formations.

By triaging all affected with signs of the disease as carefully as the wounded were sorted, masking all affected, and transporting the uncomplicated cases in ambulances carrying no other class of patients to the hospitals at Revigny set apart for this disease, and similarly transporting those evidencing the slightest signs of pneumonia to a special hospital hastily established at Brizeaux village under the charge of expert clinicians, and keeping the unaffected in the open air, the incidence of morbidity and the mortality rate from this epidemic was below that of troops in the training areas and the base sections.

While this menace did not stop the operations it slowed them perceptibly, and having passed the offensive was redoubled in vigor, the irresistible pressure of the infantry with the artillery keeping in touch day by day forcing the enemy back, his best divisions having been mercilessly hammered until sheer fatigue caused their withdrawal, the relieving divisions still weary, finding themselves ever confronted by fresh and vigorous American troops.

It had become an established custom to withdraw a division upon signs of distress and replace it with a fresh division from the Second Army which was not engaged in an offensive.

An advanced medical supply park was established at Les Islettes on October 15, and a unit prepared for the same service at Verdun. Mobile Hospital No. 6 was advanced to a point near Varennes on October 17, and the personnel of Evacuation Hospital No. 21 arrived for service with Army Red Cross Hospital No. 110 at Villers Daucourt the same date. Mobile Hospital No. 4 was moved from La Grange aux Bois to near Cheppy on October 27. Mobile Hospital No. 1 was transferred to Esnes on October 27, and Evacuation Hospital No. 4 was advanced to Fromereville on October 29.

On November 1, 1918, after a terrific and concentrated artillery preparation the three American corps advanced to their final objective, the enemy giving way easily and manifesting signs of great distress, having lost heavily in casualties and prisoners in spite of the employment of the best divisions at his disposal.

This steady advance of the Americans against the enemy's pivot had enabled the forces of the Allies to the north to drive the enemy confronting them beyond his long established and supposedly impregnable defenses, for the domination of the Mezieres-Longuyon railroad by the American artillery left the enemy only one main artery, and that too far to the north to be of assistance in extricating the mass of troops he had concentrated in an effort to check the 4th and 5th French Armies and the First American Army.

Mobile Hospital No. 8 moved from Deuxnouds to Exermont on November 3; Evacuation Hospital No. 14 moved from Les Islettes to Varennes on November 8; and Field Hospital No. 41 (Army) from Villers Daucourt on the same date, Varennes being the only point for rail evacuation for the 1st and 5th Corps, the road north of Varennes to Grand Pre not being in operation at this time.

To offset the impossibility of establishing the large and heavy evacuation hospitals at points off the rail mainly because of the lack of truck transportation, every available truck being employed to supply the huge quantities of ammunition, forage, and rations to the large force, divisional and corps field hospitals were placed in echelon to act as rest stations for the ambulance convoys en route to the evacuation and mobile hospitals, and so supplied that food, warmth, and shock treatment were available, even definitive operations being provided for.

The 3d Corps at this period having advanced as far north as desired assailed the precipitous heights across the Meuse River known as the Cote St. Germaine, the 5th Division crossing a shell and machine gun swept marsh, some of its units swimming the river and scaling the heights on the opposite side in the face of a murderous fire to eventually capture the stronghold and force the retreating enemy into the open, this performance being one of the most brilliantly executed and courageous chapters in the history of the war.

The 17th French Corps with two American Divisions attached now advanced to the north and east of Verdun, and with the 3d American Corps consolidated the gains east of the Meuse.

Four years of artillery exchange had so destroyed the railroad from Verdun to Sedan, on the west bank of the Meuse, the engineers could not repair it in time to be of use, and no attempt was made to install evacuation hospitals north of Verdun in this area, for a plunging fire from the heights had made this terrain untenable till the Cote St. Germaine was captured, and Evacuation Hospital No. 4 at Fromereville had suffered from indirect shelling although conspicuously marked and well protected from direct fire.

On November 8 the infantry of the 1st Corps pursued the rapidly retreating enemy to the river bank opposite Sedan, halting to permit the leading elements of the 4th French Army that had converged to this point to enter and capture this historic city.

With great exertion Evacuation Hospital No. 7 was moved from Souilly to St. Juvin on November 9, and Mobile Hospital No. 1 from Esnes to Bantheville on November 10, these being the two highest points attained by army hospitals, but evidencing the efforts of the Army Chief Surgeon to keep in touch with the combatant troops as long as a motor truck was available, for when transport failed the sole recourse in the absence of railroad facilities was applying the mobile surgical and X-ray camions of the mobile hospitals to the divisional triage hospitals, and slowly evacuate the operated when transportable through the chain of division and corps hospitals to the evacuation hospitals.

A glance at a contoured map of this region will show the physical obstacles to be overcome, and it should be recalled this very terrain had been the scene of disaster to more than one army in the past; therefore it is with pride the Medical Department of the First American Army invites attention to its achievements in providing hospitalization for the combatant troops in this most inhospitable and rugged terrain where not one house was left standing in the former villages, and where roads were scarce and deeply scarred by shells, all movements being accomplished in the deep mud following the incessant fall rains.

In spite of persistent rumors of an imminent armistice, the First Army continued its offensive, pursuing the rapidly retreating and disheartened enemy, who essayed escape through the Ardennes Forest, which would have proven his Waterloo had the armistice not been officially declared to be effective at 11 a. m. on November 11, 1918, infantry and artillery vying with each other in gaining ground, the seismographic tracing showing the artillery fire on the American side continuing to within one minute of the armistice hour. Within nine hours after the armistice had become effective all wounded had been hospitalized and operated.

The losses sustained in this offensive, which will descend in history as one of the most difficult military operations successfully performed, and in which the largest single army the world has known was employed, are as follows:

Killed (subject to revision)	17,647
Wounded, exclusive of 2,635 wounded prisoners	69,832
Gassed	18,864
Neurological cases (shell shock)	2,029
Total	108,372
Medical cases, largely influenza	68,760
Died from wounds	3,528
Evacuations	143,051
Hospital Trains used	408
Neurological cases returned to duty in 3 days	1,204

or 59 per cent, the difference in figures as contrasted with the St. Mihiel offensive being directly proportional to the greater volume of artillery fire in the Argonne offensive over a longer period.

The following table of operations of the Army Evacuation Ambulance Service is of interest in consideration of the magnitude of the military operations:

Trips made	24,521
Carried prone	53,210
Carried sitting	73,673
Total carried	126,883
Kilometers run	907,910

Average number of patients per trip: Corps, 4.6; Army, 4.8.
Average one way haul: Corps, 22.4 km.; Army, 12.2 km.
Percentage prone patients to total: Corps, 47.6; Army 46.0.
Average number kilometers traveled by patients: Corps 10.3; Army, 5.4.
Average number kilometers traveled per diem by Army Ambulances: 19.737.

The large number of evacuations from the Army area was necessitated by the lack of an equivalent to the French depot des Eclopes of a capacity of 10,000 at least, to which the slightly wounded, gassed, and sick who would be incapacitated for a period of ten days or two weeks could be sent, one section to be reserved for venereal cases which constitute the worst nuisance at the front.

The towns in the rear of the Army affording no buildings like those in Toul in the Second Army area and tentage being unobtainable, the solution lay in evacuation to the Advance and Intermediate Sections with a consequent loss of men for a long period, an injudicious use of hospital trains, and a congestion of the hospital centers that would have proven a calamity had the offensive continued.

From July 16–November 11, 1918, the 2d American Corps, composed of the 27th and 30th Divisions, had operated under the British north of Amiens with conspicuous success, the losses sustained being as follows:

27TH DIVISION

	Officers	*Men*
Killed	53	1,278
Wounded and gassed	184	6,958
Made prisoner	2	115
Died of wounds	11	241
Missing	3	347
Prisoners captured	65	2,292

30TH DIVISION

	Officers	*Men*
Killed	57	1,287
Wounded and gassed	125	5,345
Made prisoner	3	27
Died of wounds	(no data)	
Missing	2	201
Prisoners captured	98	3,750

From October 19–November 11, 1918, the 37th and 91st Divisions were attached to a French command in Flanders and did signal service in driving back the enemy in that sector, their sick and wounded being cared for by Evacuation Hospital No. 5 and Mobile Hospitals Nos. 8 and 9.

The casualties sustained are as follows:

37TH DIVISION

	Officers	*Men*
Killed	5	227
Wounded	34	1,279
Made prisoner and died of wounds	(no data)	
Missing	...	135
Prisoners captured	12	356

91ST DIVISION

	Officers	*Men*
Killed	14	215
Wounded and gassed	40	665
Made prisoner	...	1
Died of wounds	(no data)	
Missing	...	8
Prisoners captured	1	40

The following table is of interest, giving the data compiled for two periods, viz: the arrival of the first American unit in France, June 15, 1917, to the armistice, November 11, 1918, and the real participation of the American troops in combat from June 15, 1918, to November 11, 1918:

	June 15, 1917 *to* *November* 11, 1918	*June* 15, 1918 *to* *November* 11, 1918
Wounded, exclusive of killed and died from wounds	172,849	164,939
Killed in action [3]	33,309	32,149
Died of wounds	9,925	9,471
Total battle casualties	216,083	206,559

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[3] Subject to revision.

The apparent discrepancy between the battle figures and the totals represents the casualties occurring on the line between offensives, as action did not cease after the official inclusive dates, except that of November 11th.

At this writing nearly 12,000 men are unaccounted for, which number in the final analysis will materially alter the above figures, and this seemingly large number of missing men may be accounted for in many ways, viz., the exchange of identification tags intentionally or unintentionally, the former practice being usually in jest though sometimes with a view to escape future consequences, and the latter occurring in bathing and delousing establishments through carelessness or haste; absence without leave and secretion in some secluded village for fear of consequences; destroyed without evidence by direct shell burst or caving in of a dugout; death in some out-of-the-way location and nondiscovery; captured and died in enemy prison or en route to prison without notification under the laws of war.

The sanitation of the various fields of combat upon which the American forces performed such splendid deeds of arms has been a source of controversy between theoretical sanitarians accustomed to the impediments enjoyed in municipalities and in trench warfare, and practical sanitarians whose experience had taught the absurdity of expecting or demanding the aesthetic perfection insisted upon in mobilization and training camps or in stable trench warfare, where facilities are at hand which may not for obvious reasons be found with a constantly moving command engaged in mobile warfare.

It is regrettable that many sanitarians connected with the American Expeditionary Forces acquired their knowledge of field sanitation from perusal of monographs written during the period of indecisive trench warfare, and accepting the dicta as gospel failed utterly to visualize the futility of applying these lessons to open warfare in which man reverts to primeval instincts and practices even in well disciplined commands.

The sanitary theorist who insisted upon a command engaged in mortal combat, with the scene shifting hour by hour, employing the usual methods of conservancy would find himself promptly relegated to the rear as a nuisance, and his place filled by one who possessed the good judgment to differentiate the practical from the nonpractical.

To expect men exposed to machine gun and rifle fire to dig straddle trenches in lieu of latrines is as ridiculous as expecting a command in combat to lug along fly proof latrine boxes. Thousands of dead animals and hundreds of dead enemy soldiers littering the landscape do not make a pleasant sight, but to expect or demand the combatants cease combat to bury these human and animal bodies, which at best could only give origin to flies, would savor of the ridiculous.

With the knowledge that the American forces were at death grips with a powerful and ruthless enemy, the sanitary officers at the front refrained from making recommendations that common sense declared impractical, and confined themselves to seeing the combatant line was supplied with good water and hot food, insisting, however, and with success, that labor troops and reserves police the landscape when this duty did not interfere with the more important one of supplying the combatant troops.

When it came to sanitation of the terrain to the rear of the battle line customary standards were insisted upon and maintained, in spite of the torrents of rain and the consequent mud; and at the front and rear prompt action was taken in regard to infectious diseases with the success noted beforehand, for when all is said and done the correct handling of infectious diseases and a good water and food supply are the foremost duties of the military sanitarian at the front, and this duty was exquisitely performed by the medical officers of the Zone of the Armies.

The charge has been made that the American forces in the Marne combat failed to bury their dead promptly, and this charge has aroused both the indignation and amusement of those concerned, for history details what the American troops accomplished in that sector of bitter struggle, and it requires but little thought for even the idealist to decide that troops may not engage in such desperate combat and at the same time devote themselves to a sentiment which would be fulfilled with military honors when opportunity afforded.

The sanitation of the Zone of the Armies was practical and successful as proven by the results, and so reported by those engaged in front line service, and future diatribes appearing from the pens of idealists whose sense of proportion was disturbed by the sight of unburied human and animal dead, and men polluting the soil in the absence of latrines while the battle raged, will only advertise the idealists' ignorance of battle conditions and their desire to be captious.

The lessons learned by the Medical Department in the Zone of the Armies are manifold, and these lessons are being formulated in a manuscript by a board of officers who have the advantage of front line experience as well as the written opinions of those who have filled positions at the front and are deemed competent to pass judgment upon the essential and nonessential alike, this manuscript to be presented for approval by higher authority as the basis of a Medical Department Field Service and Equipment Manual.

The most important lessons learned, however, are: war is a game of transportation, and that each branch of the service, and particularly the

Medical Department, must provide equipment that may be easily and quickly transported upon motor trucks which must be provided in adequate numbers with trailers, and that ambulances, personnel, and hospitalization must be present in a proper ratio to the combatant troops to preclude the adoption of expedients that were never contemplated in tables of organization for a well balanced force, for only in this way may the Sanitary Service give the maximum of efficiency.

A bald narrative is a poor standard by which to judge of the enormous amount of labor entailed upon the Medical Department of the American Expeditionary Forces in the Zone of the Armies, in the greatest war of history, under the most trying conditions of terrain, transportation, and weather, and those unfamiliar with the situation will never realize the gigantic task successfully performed, nor the great personal expenditure of vital energy involved in the performance by every officer, nurse, and enlisted man.

The fine spirit and coöperation of the entire sanitary personnel is beyond praise, all working for the common cause without thought of fatigue or self; the medical officers performing prodigies on the field, in the operating and ward tents, and in supply and administration; the splendid ambulance drivers overcoming all obstacles to their mission and entering the zone of fire with a disregard of danger that was sublime; the dental surgeons unable to perform their normal duties applying first aid on the front line to release medical officers for other work and controlling litter bearer squads under fire; the enlisted personnel courageousously and doggedly performing their duties under a gruelling fire even though ready to drop from sheer fatigue after laboring hour upon hour in the exhausting duty of litter bearing; even the nurses displaying a courage and calmness under shell fire and aerial bombing that served as an incentive, and by their devotion to duty, tenderness, and self-sacrifice adding increased luster to the crown of American womanhood.

EARLY USE OF CONVALESCENT SERUM IN INFLUENZA

By Major F. D. FRANCIS, Major M. W. HALL and Captain A. R. GAINES
Medical Corps, United States Army

DURING the epidemic of influenza in January and February, 1920, at Fort Sam Houston, Texas, it was decided to make a trial of the use of convalescent serum in the treatment of the disease. There is nothing novel in this method of treatment as several reports of its use have appeared in the literature of the past two years.[1]

It was noted, however, that in all the reported experience, the serum had been used in severe cases, or the so-called influenza pneumonia. Whether pneumonia is a symptom or a complication of influenza is perhaps a debatable question. Its answer depends primarily on the criteria employed in the decision as to whether or not pneumonia is present in a given case. Influenza cases during an epidemic present all degrees of severity from a slight febrile indisposition to fulminent cases ending fatally in a few hours. All cases present some degree of respiratory involvement, as evidenced by symptoms, if not physical signs. In many cases careful study of the case will reveal physical signs of consolidation in the patients whose general condition and appearance give no cause for suspicion of serious complications. In a series of one thousand cases studied at the base hospital, Fort Sam Houston, during January and February, over 25 per cent showed persistent indeterminate râles in one or both lower lobes, and X-ray plates made from these cases give evidence of consolidation. Many of these patients give no other clinical evidence of anything resembling pneumonia.

Clinically, influenza during an epidemic, runs remarkable true to type. No other disease with which we are familiar shows case after case with practically the same course. The history of one case applies equally well to the great majority of those seen. At autopsy, too, there are distinctive findings that characterize the influenza lung, irrespective of the organism that may be demonstrated by bacteriological methods. LeCount (*Jour. Am. Med. Assn.*, 1919, lxxii, 720) says: "It is difficult to believe that a disease with so many distinctive features and affording as it has, so much novelty in pathologic anatomy, can fail to possess a correspondingly definite etiology."

If we adopt the view that epidemic influenza is an infection, usually mild and characterized by a special predilection for the respiratory tract, and fatal as a rule only when secondary infection of the damaged pulmonary tissue takes place, it would appear logical to attempt to limit the primary damage to the lungs by the early use of immune serum. The absence of knowledge of the primary etiologic agent of the disease, the only available source of such serum is the convalescent patient. It is not to be expected that results with such serum could be in any way comparable with those of diphtheria antitoxin as the serum of a convalescent would naturally contain only relatively small amounts of antibody, while a hyper-immune condition can be artificially produced in animals when the infecting agent is known. For this reason it seemed more promising to use the serum in early cases rather than in those who have already developed secondary infections, or in other words those that are commonly called influenza-pneumonia cases.

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[1] Stoll: *J. A. M. A.*, Aug. 16, 1919. Holst: *Norsk Magazin*, May, 1919. McGuire and Redden: *J. A. M. A.*, Oct. 19, 1918. Liebman: *Blatt für Schweizer Aerzte*, Oct. 12, 1918.

If the use of the serum in early cases can be shown to influence the severity of the case, to reduce the liability to secondary infection, to shorten the duration of fever or to reduce the mortality, it would appear to be evidence of the presence of immune substances in the blood of convalescents and to hold out hope that with the discovery of the primary cause of the disease treatment with hyper-immune serum would prove of practical value.

The cases treated were necessarily limited by the available supply of convalescent serum. This was obtained from volunteers, to whom was explained in each case the nature of the work being done. The response of the men to the call was very creditable. A preliminary Wassermann test was made on all who offered and only those who showed a clear-cut negative were used. The donors were selected from those who had shown a typical course of uncomplicated influenza, taking those who had had as severe an attack as possible without evidence of secondary infection. When the patient had convalesced sufficiently to stand bleeding, from 250 to 300 c.c. of his blood was drawn through a needle and tubing into a sterile flask, and allowed to clot. After about eighteen hours the separated serum was removed under aseptic conditions, treated with 0.1 per cent of trikresol and sent to the ward for use.

Twenty-six cases in all received the serum. The attempt was made to select those which on admission showed an unusually high temperature and other evidence of initial severity. The serum was given in addition to the routine treatment administered to all the cases in the hospital at the time. It consisted of one or more injections of from 50 to 100 c.c. given intramuscularly. The first injection was given as promptly after admission as was possible. Other infections followed at intervals of twenty-four hours if the course seemed to demand it. Intravenous injection was not practiced in order to avoid the complications incident to the possibility of using incompatible types of blood. In fifteen cases only one injection was given, as all acute symptoms promptly subsided. Ten cases received a second injection, and one case received three injections in four days, this being the only case in the series to develop pneumonia after treatment had been instituted. The course of the pneumonia was very mild, the temperature dropping to normal on the fifth day. In no case was there any reaction or untoward effect from the use of the serum.

The general impression of the attendants, and even of the other patients in the wards, was that the men who received the serum had an easier time. This feeling was largely responsible for the willingness with which men volunteered to supply the needed blood. Such impressions, however convincing to those concerned, are, however, of little value statistically. We therefore made a study of the cases admitted to the hospital during this period, February 1 to February 15, which was the period of our experiments. During this period 245 cases of influenza were admitted to the hospital. Of these, 26 cases of special initial severity were treated with serum, leaving 219 that received the standard treatment but without serum. Of these, 219 cases, 30 or 13.7 per cent developed "pneumonia"; that is, they showed not only physical signs but the general clinical evidence of severe pulmonary inflammation. Six patients, or 2.7 per cent, died. The average febrile period of the 219 cases was 5.8 days. Of the 26 serum cases, one case developed clinical pneumonia, none died, and the average duration of fever was 3.6 days. These findings are tabulated below:

	Treated without serum	*Treated with serum*
Number of cases...........	219	26
Developed pneumonia.....	30 or 13.7 per cent	1 or 4 per cent
Deaths....................	6 or 2.7 per cent	0
Average days of fever......	5.8	3.6

We feel that a series as small as this affords insufficient data for general conclusions, but the fact that the cases were selected for initial severity adds somewhat to the contrast between the results obtained in the treated cases and in the controls. The proportion of "pneumonia" cases was only a trifle over three-fifths of that in the control cases. When these results can be obtained with serum as relatively poor in immune bodies as that of convalescents, it seems reasonable to expect that ultimately with the discovery of the primary cause of the disease a potent antiserum may be developed. In the meantime the present method appears promising and should be employed in institutions where it is possible to obtain a supply of the serum.

HISTORY OF THE OVERSEAS DIVISION, SURGEON GENERAL'S OFFICE, DURING THE WAR PERIOD

By Lieutenant Colonel S. J. MORRIS
Medical Corps, United States Army

WHEN the United States entered the World War on April 6, 1917, the field units of the Medical Department actually organized and operating, apart from the sanitary detachments attached to combatant organizations, comprised seven field hospital companies and nine ambulance companies. There were no base or evacuation hospitals in existence as a part of the Army, nor any of the highly specialized and technical units which the experience of the allied armies had demonstrated as essential to the proper functioning of the Medical Department in the field.

For several years prior to the onset of the war, the American National Red Cross had been organizing base hospitals and other medical units which, in time of emergency, would be available for immediate duty with the Medical Department of the Army. This work had been under the supervision of the Director of Military Relief of the Red Cross, an experienced medical officer of the regular service detailed by the Surgeon General for this duty and conducted under the provisions of those paragraphs of the Manual for the Medical Department which deal with the subject of "Organized Voluntary Aid." At the date of the declaration of war, there were thus organized 50 base hospitals, 22 hospital units and 45 ambulance companies. These units were in every stage of preparedness, some practically ready for immediate duty while others were merely skeleton organizations. Some of the physicians attached were members of the Medical Reserve Corps, many were not, while attached attendants and nurses had no connection with the Army.

During the early period of the war, while the necessary changes in the administration of the Surgeon General's Office, consequent on the declaration of war, were taking place, the duties of completing the organization and mobilization of the Red Cross units, and the organization of other medical units for service overseas were assigned to various officers on duty in this office. The need of a definite program for this important work was, however, clearly apparent and when the Hospital Division of the Office of the Surgeon General was created in July, 1917, it was definitely charged "with the task of organizing all overseas units such as base hospitals, evacuation hospitals, ambulance companies, field hospitals, hospital trains, and hospital ships, together with the priority of their shipment, and with the designing, procuring, manning and controlling hospital trains, hospital cars and laboratory cars for domestic use." The Overseas Section of the Hospital Division was organized for the performance of these duties.

By May, 1918, the activities of the Overseas Section of the Hospital Division has increased to such an extent that the Surgeon General decided it to be necessary to establish an independent division in his office for the consideration of such subjects as had hitherto pertained to this section, together with certain other duties which had become closely allied therewith. Accordingly, the Overseas Division was created and to it was assigned the "organization of all medical units designated for service overseas and with the priority of their shipment; cables; liaison service between the Surgeon General's Office and the Bureau of Medicine and Surgery of the Navy Department; receiving and distributing confidential information; sanitary personnel for overseas units; female secretaries for overseas units; domestic transportation of sick and wounded." Certain of the duties included in the foregoing, as not pertaining to the general functions of this division, were later transferred to a more appropriate division, as will be noted.

While from a military viewpoint, the preservation of the health of the Army is the primary consideration of the Medical Department, the care and succor of the sick and those who have been wounded in battle has always been regarded as a matter of equal importance. There can be no question that in the public mind the care and attention of the sick and wounded stands foremost. Mistakes or errors of judgment in sanitary measures may never be known or if so, may be overlooked, but the slightest failure to render proper care to a wounded or sick soldier is certain to be heralded widely and cause severe criticism. The care of the sick has always received the utmost attention from the Medical Department and every provision for thorough first-aid and hospital treatment has been made. With the sudden expansion of the Army from some 100,000 to over 4,000,000 and the certainty of a great number of wounded to be cared for, it was urgent that evacuation hospitals, field hospitals and ambulance companies, be provided.

These duties of the Oversea Division were most exacting, on account of the detail work required to assemble the personnel of the separate units. Frequent changes in this personnel were required from time to time. The maximum force on duty in the division consisted of six officers of the Medical and Sanitary Corps and thirteen enlisted men and civilian clerks.

The Oversea Division continued to function during the period of active operations. With the signing of the armistice, the necessity for the organization of additional units for service abroad ceased and the division was discontinued December 1, 1918, by order of the Surgeon General.

After the armistice was signed, no further combatant organizations were sent overseas but a number of medical units which had been at the Port of Embarkation awaiting transportation were directed to proceed, their services being urgently needed for the care of the large number of sick and wounded at that time in the hospitals of the American Expeditionary Forces. Prompt measures were taken for the demobilization of the large number of units then in various stages of organization in this country and the discharge of officers and enlisted men attached to them was expeditiously accomplished according to the directions issued by the War Department.

Lieut. Col. W. L. Hart was in charge of this division from its inception as a section of the Hospital Division until October 15, 1918, when he was ordered to duty overseas and was relieved by Col. S. J. Morris, who continued as Chief of the Division until it ceased to function. Major H. N. Kerns was the principal assistant from June, 1918, until the division was discontinued.

In order that the necessary hospitalization may be provided for any force on taking the field for active operations, a thorough study must be made of the proportion of casualties to be expected in view of the nature of the warfare anticipated. In addition to this, there must be a thorough understanding of the sanitary conditions of the country in which operations will be carried on. This subject was carefully studied by special officers detailed by the Surgeon General, who were greatly aided by a knowledge of the experience gained by the Medical Department of the Allied Armies through several years of actual conflict. The Surgeon General therefore, upon a consideration of the reports submitted by these observers and after receiving estimates from the Chief Surgeon, American Expeditionary Forces, was able to calculate very definitely the hospitalization required. He recommended that hospital beds sufficient for 15 per cent of the troops serving abroad be provided in the hospitals of the expeditionary forces. The War Department approved of this allotment and directed the Surgeon General from time to time to organize the requisite number of units to provide such hospitalization, these medical units to be transported abroad progressively with the troops they were to serve.

The medical units organized by the Overseas Division embraced the following:

Base Hospitals, Evacuation Hospitals, Evacuation Ambulance Companies, Convalescent Camps, Convalescent Depots, Stationary Laboratories, Mobile Laboratories, Mobile Hospitals, Mobile Surgical

Units, Hospital Trains, Army Sanitary Trains, Sanitary Squads, Division Sanitary Trains, Army Ambulance Sections, Base Veterinary Hospitals, S. O. S.; Veterinary Hospitals, Corps Mobile Veterinary Hospitals, Army Mobile Veterinary Hospitals, Hospital Units, Medical Supply Depots.

Special Units.—Mobile Operating Unit, Central Optical Unit, Medical Department Replacement Unit, Neuro-surgical Unit, Aviation Medical Unit, Medical Research Board, Aviation Ophthalmo-otological Unit, Anesthetic Unit, Museum Unit, Otolaryngological Unit, Roentgenological Unit, Neuro-Psychiatric Unit, Ophthalmological Unit, Surgical Groups, Medical Classifying Unit, Rodentological Unit, Medical Department Repair Shop Unit.

PRIORITY OF SHIPMENT

The original program for the organization and shipment of troops abroad provided that the schedule be divided into six phases, certain designated organizations being allotted to each phase. Included among these were medical units in a definite fixed number, thus providing that the percentage of available hospital beds would remain constantly 15 per cent. No definite period of time was assigned for the transportation of each phase and frequent changes in the original schedule were rendered necessary by the requests from the Commanding General, A. E. F., for additional units as required.

During the year 1917, the number of vessels available for the transportation of troops from this country was limited and the total number of men sent abroad consequently small. By expeditiously completing the organization of a number of the Red Cross units previously referred to, the Medical Department was able to transfer to France during the early period of the war a larger proportion of medical units than was necessary for our forces. Certain of these units were therefore assigned to duty with the French and English armies, furnishing them with much needed medical assistance. The organization of medical units continued and during the remainder of 1917, and the first months of 1918, medical units were available in sufficient numbers.

In the spring of 1918, repeated requests came to the War Department from the Commanding General, A. E. F., for a maximum number of combatant troops. During the remainder of the war every effort was expended to that end, with the result that frequently transportation was not available for medical units when they were reported ready for shipment. The sanitary organizations attached to divisions accompanied them when they sailed for overseas, so that the medical organization of the combatant troops was intact, but medical units for the Service of Supplies, and consequently the necessary hospital facilities, began to fall short of the authorized allowance. By early summer, when American troops were actively engaged in hostilities on a large scale, the accommodations for care of the sick and wounded had fallen below the desires of this Department. Repeated requests for the transportation of medical units which were available were made to the War Department, but military necessity precluded this authorization.

The Medical Department at this time had utilized to the full extent the facilities available for the formation of units. When transportation was finally available, the number of medical units transported left a number of camps available for the organization of other units, but on account of the time required for their training and the delay in securing the necessary personnel, such units could not be completed in time to continue the medical organization in France at the proper proportion.

At no time during the war was the authorized allowance of enlisted men assigned to this department. At the beginning of the war, the Secretary of War directed that the strength of the Hospital Corps be 10 per cent of the combatant troops which they served. The necessity of placing available men in the combatant ranks was considered paramount and, despite repeated requests from the Surgeon General, it was impossible to secure the number of men essential for the formation of the units which this department was endeavoring to organize. The writer believes that to this cause more than any other was due any delay in having the required medical units ready for transportation abroad at the specified time.

In the summer of 1918, the original priority schedule, having become absolutely disrupted, was discontinued and the shipment of troops, according to a new priority schedule, was thereafter furnished by cable from the Commanding General, A. E. F., calling for such organizations as the situation demanded from time to time. Urgent requests from the Commanding General and the Chief Surgeon of the American Expeditionary Forces for additional medical units were received and the Surgeon General made strenuous efforts to comply, using all men available and combining organizations which had been partially formed in order that complete units might be ready for transportation.

ORGANIZATION OF UNITS

Shortly after the declaration of war, medical officers' training camps were established at Camp Greenleaf, Georgia, Fort Riley, Kansas, and Fort Benjamin Harrison, Indiana. The camp at Fort Benjamin Harrison was discontinued in the fall of 1917, the other camps continuing until the cessation of hostilities. At Camp Crane, Allentown, Pennsylvania, a camp was established for the formation of the units of the United States Ambulance service. All these camps were under the direct control of the Surgeon General and were selected as the sites for the organization of such medical units as would be authorized by the War Department for service overseas. To these camps were sent as many as possible of the officers and enlisted men entering the Medical Department during the war. They were given an intensive course of instruction in the duties expected of the personnel attached to sanitary organizations. At first, no special distinction was made between the various medical officers' training camps with reference to the character of the organizations to be formed therein. Later, when only the camps at Camp Greenleaf and Fort Riley were functioning, it was deemed advisable to differentiate between the character of the units to be organized in each. At Fort Riley, those units which were to perform duty with the combatant organizations, such as divisional sanitary trains, regimental detachments, sanitary squads and evacuation ambulance companies, were organized, while at Camp Greenleaf such units as pertained particularly to the Service of Supplies were mobilized.

The Red Cross Base Hospitals previously referred to were ordered mobilized in their home cities or, as camps became available, in the camps adjacent thereto. The officers of these organizations who were not already members of the Medical Reserve Corps were commissioned therein and all were called to active duty. The nurses were enrolled in the Army Nurse Corps and the male attendants were enlisted in the Regular Army. Certain officers and noncommissioned officers of the regular establishment were assigned to these units in executive capacities and superintended the organization and instruction. Several of these hospitals became promptly available for early transportation overseas and thus relieved the department for the time being of the necessity for the further organization of base hospitals.

SANITARY TRAINS AND SANITARY DETACHMENTS FOR COMBATANT ORGANIZATIONS

The Table of Organizations pertaining to the sanitary formation of a division is as follows:

The First and Second Divisions (Regular Army) were mobilized in the summer of 1917, the regiments attached thereto being selected from those which had been on duty on the Mexican border and which had their sanitary personnel already attached. The sanitary trains for these divisions were formed from the ambulance companies and field hospitals already organized at the outbreak of the war. The vacancies in the personnel of these organizations were completed by the selection of officers and enlisted men already in the service.

PERSONNEL, MEDICAL CORPS

Organization	Lieut. Col.	Maj.	Capt. or 1st Lieut.	Hosp. Sgt.	Sgt. 1 Cl.	Sgt.	Corp.	Pvt. 1 Cl. or Pvts.	Wag-oner	Cook	Far-rier	Horse shoer	Me-cha-nic	Sad-dler
Division Surgeon's Office	1	2		1	2	2	2	4						
Regiment (Infantry)		1	6		1	4		43						
Machine Gun Battalion, 2 Companies, (Infantry)			1		1	1		4						
Machine Gun Battalion, 4 Companies, (Infantry)			1		1	1		12						
Field Artillery, Regiment—2 Battalion. Motorized		1	2		1	2		16						
Field Artillery, Regiment, 2 Battalion. Horsedrawn		1	2		1	2		20						
Field Artillery, Regiment—3 Battalions		1	3		1	3		29						
Field Artillery, Trench Motor Battery						1		3						
Regiment Engineers		1	2		1	2		24						
Field Battalion—Signal Corps			1		1	1		12						
Train Headquarters, Military Police—Infantry Division			1		1	1		4						
Ammunition Train—Infantry Division		1	2		1	3		25						
Supply Train—Infantry Division			1		1	1		8						
Sanitary Squads			1 SC		1	1	2	22						
Headquarters—Sanitary Train	1		[1]		1	4		8	1					
Headquarters Ambulance Company, Section		1				1		3	1	1				
Ambulance Company Animal Drawn			5		2	11	6	108	18	3	1	2	1	1
Ambulance Company—Motorized			3		2	11	6	83	16	3			1	
Headquarter Field Hospital Section		1				1		4		1				
Field Hospital—Animal Drawn		1	5		3	6	3	56	8	2	1	1	1	1
Field Hospital—Motorized		1	5		3	6	3	55	13	2			1	
Camp Infirmary						1			1					
Divisional Medical Supply Unit			1 SC		1	1		6						

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[1] 1 captain and 2 first lieutenants of the S. C. and Q. M. C. respectively.

The next activity of the Overseas Division was directed to supplying the sanitary units for the thirty-two National Army and National Guard divisions which were organized during the late summer and fall of 1917. The National Guard divisions were formed from the preëxisting organizations of state troops. Each of the regiments among these had a sanitary unit already organized, which, while limited in numbers, had already received a certain amount of instruction and was readily capable of expansion. The vacancies in these units were filled as far as possible by enlistments in the National Guard and were finally completed by men reporting from the first draft calls. In many of the states, field hospitals and ambulance companies were among the units of the National Guard already in existence and certain of these were assigned to each division and used as the foundation from which the sanitary train was evolved. Vacancies in the personnel were filled in the same manner as noted for the regimental units.

Instructions were issued to the commanding officers of the medical officers' training camps to prepare certain selected officers and enlisted men for duty with the sanitary units of divisions and such men as were selected were given special instruction for this duty. To each of the National Army divisions which were organized in September, 1917, there was sent a skeleton from this office as they became available (the number of physicians throughout the country who were entering the service progressively increasing during this period) and by the selection of drafted men reporting at the cantonments under the first draft calls.

As rapidly as supplies became available, the sanitary units were equipped and outfitted and their training proceeded under the direction of the division surgeon. All sanitary units and personnel pertaining to the division, being an integral part thereof, were directly under the jurisdiction of the division commander, and proceeded overseas with the division, the office of the Surgeon General being in no wise connected with such movements. Each division, on embarking for service in France, had a complete sanitary personnel which was capable of functioning in a satisfactory manner.

A similar policy was adopted with reference to providing the sanitary units and personnel for divisions later formed. The difficulties which attended the procurement of the enlisted personnel for other medical units was not encountered in the case of divisional sanitary organizations as the division commanders had authority to assign drafted men arriving at their camps to these units as well as to other organizations and it was not necessary to secure from the War Department the special assignment of soldiers to the Medical Department for this purpose.

There were also organized at these camps sanitary squads in the ratio of one to each division, the personnel of which was one officer of the Sanitary Corps and twenty-six enlisted men of the Medical Department.

BASE AND EVACUATION HOSPITALS

The personnel of these organizations comprised:

Base Hospital.—1,000 *beds.*—1 colonel, M.C.; 2 lieutenant colonels, M.C.; 2 majors, M.C.; 12 captains, M.C.; 2 captains, D.C.; 3 captains, S.C.; 1 captain, Q.M.C.; 12 first lieutenants, M.C.; 1 master hospital sergeant, M.C.; 1 hospital sergeant, M.C.; 8 sergeants, first class, M.C.; 15 sergeants, M.C.; 5 corporals, M.C.; 12 cooks, M.C.; 158 privates, M.C.; 100 female nurses; 2 dietitians; 2 stenographers and typists.

Evacuation Hospital.—1 lieutenant colonel, M.C.; 4 majors, M.S.; 12 captains, M.C.; 12 first lieutenants, M.C.; 1 captain or first lieutenant, D.C.; 3 captains or first lieutenants, S.C.; 1 captain or first lieutenant, Q.M.C.; 1 master hospital sergeant, M.C.; 2 hospital sergeants, M.C.; 10 sergeants, first class, M.C.; 20 sergeants, M.C.; 5 corporals, M.C.; 14 cooks, M.C.; 185 privates.

The most important of the units which this division organized for overseas service, and those which required the greatest amount of time and detail, were the base and evacuation hospitals. On such organizations it became incumbent to supply practically all of the permanent hospitalization facilities for the American Expeditionary Forces. The absolute necessity of a sufficient number of these hospitals with a thoroughly efficient staff became early apparent. Every effort was made by the Overseas Division to facilitate the organization of such units and to provide well in advance for a sufficient number in order that a thorough course of training might be given before their transfer to ports of embarkation preparatory to service abroad. Owing to the changes in the priority schedule and the difficulty in securing the assignment of sufficient enlisted personnel to this department, many obstacles were encountered in the attempt to carry out the program adopted. At times it became necessary to hurriedly assemble the authorized personnel, designate the unit as a base or evacuation hospital and report it as ready for shipment, when the state of training was in a lamentable degree of inefficiency. The Surgeon General greatly regretted having to send such organizations to the zone of active operations but was aware that training could proceed after arrival overseas and that the additional numbers would be a great aid to the already overburdened Medical Department abroad.

The tentative program arranged by this division provided for the organization of a certain number of base and evacuation hospitals at the medical officers' training camps, such hospitals to remain at these camps for a period of approximately six weeks for a course of instruction relating strictly to the military side of the unit. After this course, it was purposed to send the hospital to one of the cantonments for further instruction, with particular emphasis to be laid on the duties of a professional nature which would fall to the lot of the personnel. At these camps, the hospital would be attached to the permanent base hospital, the various members of the unit being assigned to duties analogous to those they would perform when the hospital functioned independently. Such a training program was followed by some of the units first organized with thorough success, and such units were all prepared for the performance of the duties pertaining to them by the time they were ordered abroad.

The disarrangement of the priority schedule, as at first directed, played havoc with the program arranged by this division for the organization of new base and evacuation hospitals. When the hospitals already organized could not be transferred, by reason of lack of transportation, there necessarily followed a shortage of places available for the mobilization of new units. This was overcome in part by securing authority from the War Department to designate certain cantonments as places where additional hospitals could be organized. There was, however, a constant lack of available enlisted personnel so that many of the units under organization actually had only a small part of such personnel, or of the required number of officers. Shortly before the armistice was signed and when the American forces were engaged in their heaviest fighting, urgent demands for additional medical units were received from the commanding general. In order to meet these demands, many of the existing units were ordered to be consolidated and in this way, a number of completed base and evacuation hospitals were rendered immediately available for overseas service.

Before the World War, the bed capacity of a base or evacuation hospital was 500. This was increased for both units to 1,000 beds. Their capacity was capable of further expansion so that frequently these units in active service would care for several thousand patients. In the administrative organization of a base hospital, one medical officer, the three Sanitary Corps officers and the officer of the Quartermaster Corps were assigned to purely executive duties, a colonel or lieutenant colonel of the Medical Corps being the commanding officer, the three Sanitary Corps officers acting as adjutant, registrar and mess officer, and the Quartermaster Corps officer as quartermaster. The other medical officers and officers of the Dental Corps were designated to perform the strictly professional medical work of the unit. This service was subdivided as follows:

Surgical Service
1 chief
11 general surgeons
1 orthopedic surgeon
1 genitourinary surgeon
1 brain surgeon
1 otolaryngologist
1 ophthalmologist
1 oral surgeon

Medical Service
1 chief
3 assistants in general medicine
1 neurologist

Laboratory Service
1 chief
2 assistants

Dental Service
2 dentists

2 roentgenologists

This assignment to duty furnished a well-balanced professional staff, especially for duty near the zone of active operations where battle casualties would constitute the greater portion of patients. In case certain hospitals were designated more exclusively for the care of general medical cases, necessary changes in the personnel were made by the Chief Surgeon, A. E. F. The formation of an evacuation hospital was similar to that for a base hospital, the commissioned personnel one less by only one dentist.

In addition to the base hospitals organized for general service, certain units were prepared with a view to assignment to duty for the treatment of special classes of patients. Among these were units for the care of orthopedic patients, venereal patients, cases of brain surgery, for special fracture cases and for neuropsychiatry. The hospitals were given the regular serial number of base hospitals, but their personnel comprised only specialists in such diseases and injuries as would be required to care for.

In the organization of these units, the Surgeon General would first secure authority for the formation of the number desired at a given time and the designation of the camp at which each unit would be mobilized. The commanding officer of the camp would then be directed to organize the unit assigning the enlisted personnel thereto. Upon the arrival of enlisted men at their first camp, classification cards were made for each, showing the special qualification of every man in any line of work, such as mechanic, carpenter, clerk, hospital attendant, etc. These cards were filed according to the classification of the men. The Committee on the Classification of Personnel of the War Department had arranged complete lists of organizations showing the number of men under each occupational classification who were best fitted for duty therein. In selecting men for these medical units, the commanding officer of the camp would, as far as practicable, select men best qualified according to these lists. In addition, at each of the medical officers' training camps there had been established special schools for the training of men in the various duties which would be required in sanitary organizations.

These schools included schools for cooks and bakers, training as X-ray assistants, special training in orthopedic work including the manufacture of the various appliances required, schools pertaining to the clerical work required in the Medical Department, etc. Whenever possible, soldiers who had received instructions in these schools were assigned to the units being organized for the duties in which they had been specially instructed.

The divisions of this office in charge of the special branches of medicine and surgery would furnish to the Overseas Division the names of the officers to be assigned to the unit for the special duties previously noted. Orders on these officers would be obtained from the War Department and they would report to the commanding officer of the organization for duty. At times there would be a shortage of officers available by the special divisions for such assignments, but on the whole very little delay was encountered. Special attention was paid by this division to the selection of the commanding officer of the unit, only such officers being selected as had records showing special administrative efficiency and ability to command. In the designation of the mess officer, every effort was made to secure a man experienced in the methods of procuring, preparing and serving food, either a former noncommissioned officer who had previously served as a mess sergeant or an officer from civil life whose prior occupation had been as manager or steward of a restaurant, club or hotel. Many excellent officers were obtained for these places and the mess management of these units in general was excellent. The professional qualifications of the medical officers assigned to duty in the various specialties were usually of a high order, such officers having been assigned to their respective specialties after a thorough investigation as to their capabilities. In addition, many of these officers had recently completed a course of instruction in one of the special schools which had been established at Camp Greenleaf and which were equipped in every way to give advanced teaching. The proper quota of nurses was assigned to each base or evacuation hospital organized by the Nursing Division of the Surgeon General's Office and two female stenographers were assigned to each by the Oversea Division.

When the hospital unit was completely organized and equipped, it was retained in the camp where organized or attached to the base hospital at one of the cantonments until a satisfactory degree of training had been attained, if the movement of troops overseas permitted this delay. If the services of a unit were immediately desired overseas and transportation was available, the hospital as soon as organized, was reported to the Chief of Embarkation Service of the General Staff as available and orders directing the movement to a port of embarkation would be issued. Upon the receipt of such orders, the unit passed from under the immediate jurisdiction of the Surgeon General. In some instances, where haste was essential, the entire personnel of officers did not join the unit at the place of mobilization but were ordered directly to the port of embarkation to await its arrival and join it at that point. In a few cases, officers were sent abroad for special study before the hospital was ready to sail and so reported for duty after its arrival overseas.

When a base or evacuation hospital was organized, the Finance and Supply Division of this office was notified of the fact, together with the approximate date of sailing; that division then arranged for the medical supplies of the unit to be shipped at the same time, so that the entire equipment of the hospital would be available upon its arrival in France. Certain difficulties were encountered in following this program and some of the hospitals arrived abroad without their complete equipment, but were properly outfitted by the Medical Supply Department of the A. E. F. It has been a mooted question whether each hospital should be supplied with its complete unit equipment before sailing or upon arrival. It appears by far the wiser plan to have the complete unit assembled and turned over to the commanding officer prior to departure from the port of embarkation, the supplies to accompany the unit. In this way there can be no delay in placing the hospital immediately in service upon its arrival.

In all, 162 base hospitals and 59 evacuation hospitals were organized in this country. Of these, 121 base hospitals and 40 evacuation hospitals were actually transported for duty overseas. The remainder, which were in various stages of preparedness at the date of the signing of the armistice were demobilized as rapidly as possible.

Convalescent Camps.—1 major, M.C.; 4 captains, M.C.; 4 first lieutenants; 5 sergeants, first class, M.C.; 14 sergeants, M.C.; 5 corporals, M.C.; 16 cooks, M.C.; 50 privates, M.C.; 1 first lieutenant, Q.M.C.

Convalescent Depots.—Personnel of Medical Corps. 1 major; 4 captains; 4 first lieutenants; 1 sergeant, first class; 4 sergeants; 20 privates; 1 captain, Q.M.C.

The duties of the convalescent camps and convalescent depots were implied in their names. They were usually attached to base hospitals, forming departments for the care of convalescent patients. Convalescent depots were also used with the armies in establishing the stations for slightly wounded.

These units were organized at the medical officers' training camps, the greater number at Camp Greenleaf, and after their organization was completed, were reported to the Chief of Embarkation Service, General Staff, for transportation overseas. The general principles observed in organizing these units followed those outlined for the formation of base hospitals. In all, fourteen convalescent camps and one convalescent depot were sent overseas.

Evacuation Ambulance Company.—Personnel of the Medical Corps. 1 first lieutenant; 1 sergeant, first class; 2 sergeants; 2 cooks; 3 mechanics; 23 wagoners; 6 privates.

These units were organized at medical officers' training camps, chiefly at Fort Riley. They were transferred directly from these camps to the ports of embarkation for shipment abroad. Ninety-two evacuation ambulance companies were organized in this country, 72 of which were transported for duty overseas.

ARMY AMBULANCE SECTIONS

Before the United States entered the World War, a number of volunteer ambulance companies had been organized in France chiefly from the colleges of this country. After war was declared, the War Department authorized the organization of the United States Ambulance Service to consist of 169 sections, of which 28 were formed from the sections which were already rendering volunteer service with the French Army. The remainder were organized at Camp Crane, Allentown, Pennsylvania, this camp having been established especially for this purpose. During the first few months of the war, the organization of these sections was directly under the jurisdiction of the commanding officer of the United States Ambulance Service. After the departure of the headquarters of this service for France, the formation of these units was directed by the Overseas Division. As rapidly as units could be organized and transportation became available they were sent to France for service. During 1917, the enlisted personnel of these units was obtained through voluntary enlistments; after enlisting ceased, certain numbers of drafted men were sent to Camp Crane for mobilization and assigned to the sections. One hundred thirty-seven ambulance sections were organized and 120 were sent overseas. The table of organization authorized the following strength for each unit:

Ambulance Section.—Personnel of the Medical Corps. 1 captain; 1 sergeant, first class; 2 sergeants; 1 corporal; 2 cooks; 6 mechanics; 22 privates, first class; 11 privates.

Replacement Units.—In view of the numerous casualties to be expected among the personnel of sanitary units attached to combatant troops during active operations, provision had to be made for supplying men to fill the vacancies which would exist among such formations. To accomplish this replacement, units were formed consisting of 2 officers and 250 men each. These units were organized at the various medical training camps and dispatched overseas as promptly as the men could be procured and transportation was available. During the continuance of the war 56 such units were actually sent to the American Expeditionary Forces. There was also a necessity for the transfer of additional officers abroad to replace those who for various reasons had become unavailable for further service. Parties of officers from the medical officers' training camp were constantly being ordered to France for this purpose. The number of officers who were thus transferred, unattached to medical units, is not available, but totals a large number.

Mobile Hospitals and Mobile Surgical Units.—The development of modern warfare had necessitated the adoption by the allied armies of new mobile sanitary formations by which facilities for rendering immediate surgical aid and chance of recovery to the seriously wounded could be brought directly to the injured men in place of having to carry the nontransportable wounded for indefinite distances to established hospitals. To meet such conditions mobile hospitals which had not previously been a part of our sanitary formation, were authorized. Such units were an adaptation of the auto chairs (autonomes) of the French Army.

A mobile hospital consisted of fixed sterilizing, X-ray and electric lighting plants mounted on two motor trucks. In addition and carried on motor trucks, were a light frame operating room, tentage and sufficient hospital and surgical supplies to fully equip a surgical hospital of 120 beds with modern surgical facilities for the work of 6 operating teams. Such hospitals could function independently when conditions required or could be attached to other advanced sanitary formations to furnish additional surgical assistance. The personnel of such a unit was:

Mobile Hospital.—Personnel of the Medical Corps. 1 major; 10 captains or first lieutenants; 1 sergeant, first class; 17 sergeants; 62 privates, first class and privates; 22 female nurses; 1 captain or first lieutenant, S.C.

The mobile surgical unit was another medical formation which was the outcome of the experience gained during the present war. Frequently after an extensive battle, the surgical equipment of the sanitary formation in the zone of the army was insufficient to provide operating facilities for the large number of wounded requiring immediate surgical attention. This unit was adopted from the French *Group Complementaire* and consisted of portable sterilizing, X-ray and electric lighting plant, a light frame operating room and surgical supplies mounted on two motor trucks, or a truck and a trailer. The unit did not provide hospitalization facilities and therefore could not function independently. It supplemented the equipment of the advanced field hospitals and was available for use wherever its services might be most needed. The personnel of this unit was:

Mobile Surgical Unit.—Personnel of Medical Corps. 1 captain or first class lieutenant; 1 sergeant, first class; 3 sergeants; 8 privates, first class; and privates.

It was not the purpose of this unit to furnish an adequate personnel of officers, the necessary surgical staff being supplied from the permanent personnel of the field hospital with which the unit was serving, or by the use of special surgical teams detailed to this duty.

Of these organizations 6 mobile hospitals and 7 mobile surgical units were organized and 6 mobile hospitals and 4 mobile surgical units were sent overseas.

Medical Supply Depots, Stationary Laboratories and Mobile Laboratories.—These units, which were not provided for as sanitary formations prior to the World War, functioned for such duties as are indicated by their titles. The authorized personnel for each was:

Medical Supply Depot.—Personnel of the Sanitary Corps. 3 captains or first lieutenants; 1 hospital sergeant; 2 sergeants, first class; 4 sergeants; 4 corporals; 2 cooks; 10 privates, first class; 22 privates. Mixed unit, either M.D. or S.C., enlisted personnel.

Stationary Laboratory.—Personnel of the Medical Corps. 1 major; 5 captains or first lieutenants; 1 sergeant, first class; 3 sergeants; 8 privates, first class and privates.

Mobile Laboratory.—Personnel, Medical Corps. 1 captain or first lieutenant; 1 sergeant; 3 privates, first class and privates. 1 first lieutenant, S.C.

Of these units the following were sent overseas for service:

9 Medical Supply Depots; 5 Stationary Laboratories; 5 Mobile Laboratories.

HOSPITAL UNITS

Prior to the onset of the World War the American National Red Cross had organized a number of hospital units in various cities throughout the country, the personnel of each consisting of 7 officers and 47 enlisted men. These units were mobilized during the early period of the war and 18 of them were sent to France where they were attached to other sanitary organizations, generally to base hospitals. They did not operate independently.

SPECIAL UNITS

The following is a list of special units organized by this Division for service with the American Expeditionary Forces:

Mobile Operating Unit No. 1
Medical Department Replacement Unit No. 1
Aviation Medical Unit No. 1
Aviation Opthalmoötological Unit No. 1
Museum Unit No. 1
Roentgenological Unit No. 1
Ophthalmological Unit No. 1
Medical Classifying Unit No. 1
Central Optical Unit No. 1
Neurosurgical Unit No. 1
Medical Research Board No. 1
Anesthetic Unit No. 1
Otolaryngological Unit No. 1
Neuropsychiatric Units Nos. 1 and 2
Surgical Groups Nos. 1, 2, 3, 4, 5, 6, 7, 8 and 10
Rodentological Unit No. 1
Medical Department Repair Shop Unit No. 1.

These units were organized at the request of the Chief Surgeon, A. E. F., for special duties which could not be performed by the regular sanitary formations. The functions performed by these units are indicated by their names. The personnel was generally few in number and was designated by the professional divisions of this office to which their work pertained. These units were mobilized at different camps and, as promptly as they could be assembled and their equipment provided, were sent overseas.

VETERINARY UNITS

In addition to the medical units noted, the following veterinary units were organized for duty overseas:

Base Veterinary Hospitals
S.O.S. Veterinary Hospitals
Corps Mobile Veterinary Hospitals
Army Mobile Veterinary Hospitals.

All these hospitals were organized and their training directed by the Veterinary Division of the Office of the Surgeon General and when considered ready for overseas duty, were reported to this division which arranged for their transfer. The subject of the formation of these units is fully treated in the section devoted to the Veterinary Division.

HOSPITAL SHIPS

While no hospital ships were authorized for the Medical Department of the Army and while the care of the sick and wounded who were returned from France was entirely under the jurisdiction of the Medical Department of the Navy, it is considered most advisable to devote considerable space to a consideration of this subject. The unanimous opinion of officers of this Department would unquestionably be to the effect that the transfer of sick and wounded military personnel of an expeditionary force service overseas, should be effected in properly equipped hospital ships entirely under the control of the Medical Department of the Army.

Under date of March 28, 1918, a joint agreement between the Secretary of War and the Secretary of the Navy provided for the return of patients as follows:

Copy for: The Surgeon General.

The following articles set forth an agreement entered into by the Secretaries of War and Navy, which shall govern the Army and Navy in the transportation of the sick and wounded between the United States and France or England and the disposal of the remains of officers, enlisted men and civilian employees of the Army, Navy and Marine Corps who die between the United States and France or England, or in France.

Article I. Sick and Wounded.

(*a*) Sick and wounded being brought from France or England to the United

States will be brought in Navy hospital ships or transports, whichever may be most suitable and available, except in special cases where transportation by commercial liners as may be authorized.

(*b*) The Army will be in charge of the embarkation and debarkation of all Army patients.

(*c*) The Navy will be charged with the care of these patients while on board ships of the Navy acting as transports or otherwise. At the request of the Navy, the Army will render such assistance in personnel and material as may be necessary.

(*d*) No patients will be returned to the United States, if, in the opinion of the Surgeons concerned, they will probably recover within six months.

Article II. Disposition of Remains of Those Who Die at Sea.

(*a*) The remains of all officers, enlisted men and civilian employees of the Army, Navy and Marine Corps, who have died or who may hereafter die in France, shall be buried in France until the end of the war, when the remains shall be brought back to the United States for final interment.

(*b*) Such cemeterial facilities as the Army may have acquired in France shall be available to the Navy.

Article III. Disposition of Remains of Those Who Die at Sea.

(*a*) The remains of all officers, enlisted men and civilian employees of the Army, Navy or Marine Corps who die on board a ship enroute to or from the United States, shall be embalmed and returned to the United States on board the ship on which the death occurred.

(*b*) All ships engaged in transporting troops shall be equipped with the necessary personnel and material to carry the foregoing requirements into effect.

Article IV. Enforcement.

The War and Navy Departments will at once take the necessary steps to put the foregoing into effect.

War Department, March 28, 1918	Navy Department, March 28, 1918
BENEDICT CROWELL,	JOSEPHUS DANIELS,
Acting Secretary of War.	*Secretary of Navy.*

Initialed by: Genl. Jervy, W. V. P. Capt. Pratt.

An amendment of this agreement was effected on June 30, 1918, as follows:

WAR DEPARTMENT

WASHINGTON, *June* 30, 1918.

The following articles set forth a change in an agreement entered into by the Secretaries of War and Navy which will govern the Army and Navy in the transportation of the sick and wounded between the United States and France or England, the disposal of the remains of officers, enlisted men and civilian employees of the Army, Navy and Marine Corps, who die between the United States and France or England, or in France.

Article I.

Paragraph (*d*) *Article I.* Agreement entered into by the Secretaries of the War and Navy Departments, March 28, 1918, in reference to transportation of the sick and wounded between the United States and France and England, and the disposal of the remains of officers, enlisted men and civilians in the employ of the

Army, Navy and Marine Corps, who die between the United States and France or England, or in France, is hereby revoked and the following substituted therefor.

Paragraph (*d*). The Commanding General of American Expeditionary Forces will decide what class of patients and the numbers of each he desires returned to the United States. He will ascertain the actual number of each class that can be accommodated on each vessel from the senior Naval Surgeon through the Commanding Officer of that vessel and will not exceed that number.

Article II.

Enforcement.

The War and Navy Departments will at once take the necessary steps to put the foregoing into effect.

War Department, June 30, 1918.	Navy Department, July 2, 1918.
(*Signed*) NEWTON D. BAKER,	(*Signed*) JOSEPHUS DANIELS,
Secretary of War.	*Secretary of Navy.*

The policy which the Surgeon General desired to be adopted with reference to this subject is set forth in the lengthy correspondence preserved in the original manuscript of this history.

The armistice was signed before it had been necessary to bring back to this country a large number of patients from the hospitals of the expeditionary forces. The hospital facilities in France and England being sufficient to care for the patients then on hand, no difficulty was experienced in returning the sick and wounded on the regular transports, as they could be distributed over as long a period as was necessary. Had the war continued for a longer period the return of a large number of patients to this country would have been inevitable in order that the hospitals abroad might have sufficient beds to care for the constant inflow of sick and wounded. Under such conditions it is uncertain whether the policy of returning large numbers of patients on transports would have succeeded.

CABLES

To this division was entrusted the general charge of the cable service between the office of the Surgeon General and the American Expeditionary Forces. All cables sent from this country to the forces abroad went through the cable branch of the General Staff. This branch received all cables from overseas and distributed them to the departments and bureaus which were concerned with the contents. All such messages for this office were received in the Overseas Division and transmitted to the proper officer for action, careful check being kept that when answer was necessary it would be promptly attended to. This duty pertained more practically to the administration division of the office of the Surgeon General and during the latter part of the war was transferred to that division.

LIAISON SERVICE BETWEEN THE SURGEON GENERAL OF THE ARMY AND OF THE NAVY

The agreement, which has been previously noted, respecting the return of the sick and wounded from abroad by which such transfer of patients was under the jurisdiction of the Surgeon General of the Navy, rendered necessary considerable intercommunication between the two offices. This liaison service was rendered entirely by the officers of this division. Relations were at all times most harmonious and a marked spirit of coöperation existed.

CONFIDENTIAL INFORMATION

During a portion of the war the Overseas Division was the custodian and branch of transmittal in the Surgeon General's Office of all confidential information received from the War Department. Upon receipt of any confidential communications, copies would be made and distributed to the officers concerned. Such documents were at all times kept securely locked in metal filing cases.

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THE FUTURE OF PSYCHIATRY IN THE ARMY[1]

By Colonel THOMAS W. SALMON
Medical Reserve Corps, United States Army[2]

THE future of medicine or of any branch of medicine in the Army is inseparably linked with the future of medicine in general. The work of the medical officer of the army—whether in the regular establishment or in the emergency forces—is no more special and unrelated to the whole of medicine than is that of any other physician, surgeon or sanitarian who is dealing with one of the more specific tasks of our profession. Anything that emphasizes the distinction between military and civil physicians impairs the solidarity which the whole medical profession must possess if it is to serve humanity in accordance with its opportunities in war as well as in peace.

If the future of military medicine is but a phase of the future of medicine in general, we may gain some insight into the future of psychiatry in the Army by considering for a few minutes the present outlook for psychiatry in civil life. The last few years have seen a rapid extension of the frontiers of all branches of medicine, especially in their social applications. Dealing as it does with the deep springs of human conduct, it is not surprising that psychiatry should have extended its own frontiers in this direction even further than some other branches of medicine have. For many years—indeed ever since the insane came into the hands of physicians from those of demon-exorcisers, jail keepers and poormasters—psychiatry has concerned itself almost exclusively with insanity. Today that term is properly applied to only a relatively small proportion of all the persons in whom psychiatrists are interested, or even of all persons who suffer from mental diseases or other abnormal mental states. It has been proposed by Dr. William A. White[3] to abandon the term "insanity" in medicine and to transfer it, as a gift in perpetuity, to the lawyers, who seem to have much more use for it than we have and really know much more about it. If that were done "the insane" would consist only of people with mental diseases who, in addition, suffer from some such legal disability as enforced detention in an institution or deprivation of certain civil rights. Many mentally sick persons would be still, unfortunately, insane but the majority would not. The effect upon "expert" testimony of such a change in terminology would be startling but very much to the advantage of both the medical and the legal professions. Psychiatrists would continue to differ on the issue of mental disease as physicians do about many other diseases when in clinical conference, but lawyers could debate exclusively with each other the issue of "insanity," settling it in the end, as they do now, by reference to statutes and court decisions and not to medical facts.

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[1] Read at the twenty-eighth annual meeting of the Association of Military Surgeons of the United States, New Orleans, La., April 23, 1920.

[2] Recently Senior Consultant in Neuropsychiatry, A. E. F.

[3] White, W. A.: "Dividing line between general hospital and hospital for insane." St. Louis, Modern Hospital Publishing Co., 1914. Reprint from *Modern Hospital*, 2:135–38, March, 1914.

Not only mental diseases among those who are not "insane" (to use this word in the sense proposed) but other disorders that are classified as mental diseases only for convenience have come into the field of psychiatry. Mental deficiency—with its enormously important radiations into poverty, delinquency and crime—lies today very largely within the field of psychiatry as do the psychoneuroses, which originate, run their course and end in the home, the school, the factory and the military camp.

Very few people realize what a vast domain in medicine is actually filled by the three groups of mental disorders that have just been mentioned. I should like to give a few statistics on this subject and so certain am I that they will be received with incredulity as to their soundness or the accuracy of the sources of my information, that I have taken the liberty of giving in detail, for publication with this paper when it appears in the transactions of the Association, the exact data upon which they are based. The number of insane in institutions—and following a strictly medical terminology there are few elsewhere—almost equals the total number of patients in all the general hospitals in the United States.[4] In the Army and Navy, mental diseases have for many years occupied first or second place in discharges for disability.[5] States that make full provision for the care of mental diseases in public institutions spend more for this purpose than they do for any other, except education.[6] In the state of New York, in 1919, *one death in twenty-two in the whole adult population occurred in a hospital for the insane.*[7] Today, 36 per cent of all hospital patients cared for by the Public Health Service as beneficiaries of the Bureau of War Risk Insurance are mental or nervous cases.[8]

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[4] Pollock, H. M., and E. M. Furbush: "Annual census of the insane, feeble-minded, epileptics and inebriates in institutions in the United States, January 1, 1918." Reprint 40 from *Mental Hygiene*, 3: 78–107, January, 1919.

Total number of insane in hospitals, January 1, 1918, was 239,820.

U. S. Treasury Department: "Additional hospital facilities for discharged soldiers, sailors, marines and army and navy nurses." U. S. Congress, 66th, 2d session, H. R. Document No. 481, p. 27. Letter from the Secretary of the Treasury. December 5, 1919.

Total number of beds in general hospitals in United States for the year 1918 was 270,209.

[5] U. S. Army: "Annual reports of the Surgeon General."

U. S. Navy: "Annual reports of the Surgeon General" (Chief of the Bureau of Medicine and Surgery).

[6] National Committee for Mental Hygiene: "Handbook of the Mental Hygiene Movement and Exhibit." New York, 1913. Chart No. 13.

[7] Total number of deaths in New York State in 1919 was 142,447; total deaths, 20 years and over, 107,798; total deaths in hospitals for mental diseases, 4,884.

No one knows how prevalent the psychoneuroses are in the civil population. Some idea may be gained from half an hour's consideration of fifty of the men, and their wives, whom you know best, reviewing in your mind the number of instances in which there has occurred, to your personal knowledge, some kind of "nervous breakdown" or other evidence of a psychoneurotic reaction to the vicissitudes of life. In the World War, the psychoneuroses, as everyone now knows, constituted a major medico-military problem in the armies of our allies. Twenty per cent of the soldiers discharged for disability from the British Army had one or another of the disorders grouped under the terms "shell shock," "neurasthenia" or the better one of "war neurosis."[9] Our own military medical officers who were interested in the clinical aspects of chemical warfare will tell you how the "gas neuroses" bothered them in the gas hospitals near the front. The orthopedists will describe the weird aura of functional symptoms that surrounded undoubtedly organic cases and served to retard recovery or to increase disability.[10] The internists gave a name suggesting effort rather than lack of it to the functional heart disorders of the soldier but all of them agreed upon the essentially psychoneurotic nature of the reaction.[11] In our army in France, the wave of war neuroses among combatant troops rose until it caused no little apprehension among line as well as medical officers and then, under a system of management based squarely upon a psycho-biological conception of the nature and genesis of functional nervous diseases, subsided until it ceased to threaten the morale of troops or to constitute a drain upon our over-taxed hospital facilities.[12] In the camps in the United States, as Colonel Bailey has shown,[13] these disorders played an even larger part than they did on the battlefields and in the base hospitals of France.

Psychiatry has a task in the diagnosis and treatment of these mental disorders in civil life much too large for the trained personnel available for dealing with it. The workers needed will never be supplied by a system of medical education that, in the standard medical curriculum, devotes 30 of the 2,000 hours in the two clinical years to instruction in psychiatry. The new university psychiatric clinics being established—in some instances as a direct outcome of the experience of the war—will afford the best possible means not only for training specialists in mental diseases but for providing every graduate in medicine with some knowledge of mental phenomena in sickness and in health. In spite of this shortage in the number of workers in the older and more conventional fields of psychiatry, there is a constant demand for men in altogether new fields. The trend toward managing delinquency and crime along psychiatric lines is one of the most striking and unexpected developments in applied medicine. A great state is now reorganizing its correctional system by providing a central classification prison for the reception of all new prisoners, in which the corner-stone is a psychiatric clinic.[14] It is hardly necessary to remind the members of this Association of the pioneer work in this field of Major Edgar King of the Army, at the U. S. Disciplinary Barracks at Fort Leavenworth, where practically all that is done in the reclamation of prisoners is based upon the findings and recommendations of the Department of Psychiatry and Sociology of which Major King is the head.[15] The demand for psychiatrists for positions in juvenile and domestic relations courts and correctional institutions that come to me in my work with the National Committee for Mental Hygiene would exhaust the entire annual output of men trained in the few existing psychiatric clinics.

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[8] U. S. Treasury Department: "Additional Hospital Facilities for Discharged Soldiers, Sailors, Marines and Army and Navy Nurses." U. S. Congress, 66th, 2d Session, H. R. Document No. 481, p. 11. Letter from the Secretary of the Treasury. December 5, 1919.

[9] Collie, Sir John: "Management of War Neuroses and Allied Disorders in the Army." Reprint 26 from *Mental Hygiene*, 2:1–18, January, 1918.

[10] Hammond, R.: "Military Orthopedic Hospitals in the British Isles." U. S. Naval Medical Bulletin, 14:64–101, January, 1920. Section on Functional Disabilities, pp. 94–95.

[11] Oppenheimer, B. S. and M. A. Rothschild: "The Psychoneurotic Factor in the Irritable Heart of Soldiers." *Journal* American Medical Association, 70: 1919-22, June 22, 1918.

[12] Schwab, S. I.: "War Neuroses as Physiologic Conservations." Reprint from the *Archives of Neurology and Psychiatry*, 1:579–635, May, 1919.

[13] Bailey, Pearce: "War's Big Lesson in Mental and Nervous Diseases." Reprint from the *New York Times*, September 14, 1919.

In the field of preventive medicine, psychiatry is represented by mental hygiene. The preventive side of mental medicine, dealing so largely with the problems of childhood, is of special interest to social workers. There has just closed in this city a session of the National Conference of Social Work, an organization representing every variety of social work carried on in the United States and Canada. This conference has ten sections and in each there was at least one paper dealing with mental hygiene, although there is a special section on mental hygiene which is always very largely attended.

I have not presented these comments on the amazing growth of the extra-institutional field of psychiatry with the intention of unduly emphasizing the importance of this specialty. No one knows better than I do how slender are some of our resources, how few and, in many cases, how inadequately trained are our personnel or how much we have suffered and still suffer from that unfortunate isolation from the rest of medicine which our early work with the insane has entailed. The fact that this isolation is breaking down, that the familiar medical joke about all psychiatrists being a little crazy is not nearly as dependable a laugh-raiser as it used to be, and the slow realization on the part of our colleagues in other work that a psychiatrist may be a clinician working in a special field and not necessarily a mixture of one part introspective philosopher, one part dreamer, and one part humbug—all indicate that the future of psychiatry will be more closely linked with that of the rest of medicine than its past has been. Of all the factors that have served to bring about the important change that justifies this prediction, none can compare with the effect of working side by side in every medical activity of the war from the first steps in picking an army as free as possible from physical and mental defectives to service with troops at the front. Surgeons, internists, and medical administrators saw in the neuro-psychiatric wards of our great military administrators here and in France other medical officers who were neither a little crazy, introspective philosophers, dreamers, nor humbugs, but colleagues working away at clinical problems that were often similar to their own and not infrequently overlapped them.

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[14] Pilcher, L. F.: "Psychiatric Classification in Prison." *American Architect*, 117:97–106, January 28, 1920.

[15] King, Edgar: "The Military Delinquent." THE MILITARY SURGEON, 37:574–78, December, 1915.

The future of psychiatry in civil life, then, as far as can be predicted from present indications, will bring an increasing community of interest between psychiatrists and other physicians in clinical work, medical teaching and medical research and the promise of an inspiriting advance, *together*, into the wide field of social medicine. If the future of medicine in the Army is only a phase of the future of medicine in general, it will take but a few minutes to outline some of the features of special interest in the future of psychiatry in the Army.

A surprisingly large number of activities of the medical officer of the Army are shared with advantage by the psychiatrist. In the great task of selecting the human raw material out of which to construct an army for peace or an army for war, the psychiatrist has a particularly useful place. There is no time here to review the results in decreasing military delinquency, lessening the insanity rate and preventing unstable officers and men from being exposed to special stress that resulted from the elimination of 72,000 cases of mental and nervous disease from the Army during the war. Difficult problems in the psychiatric examination of recruits which have a very special military bearing must still be solved. Distinguishing between mental deficiency and the mental reactions determined by deprivation of educational and social advantages is one of these problems. It must be solved, in the Army, by the joint work of psychiatrists and psychologists and will never be solved by either working alone. There are highly important psychiatric problems involved in the application of tests to determine special fitness and vocational aptitude. If the Army is to be the "free vocational university" that it is the ambition of the Secretary of War to have it become, the "human element," which is the *mental* element, must receive the most careful consideration in formulating plans. The administration of military justice, not only in courts-martial but in military disciplinary institutions, requires the aid of psychiatry exactly as much as the administration of justice in civil courts and civil correctional institutions does. The treatment of mental diseases in neuropsychiatric departments of favorably situated permanent general hospitals will demand the services of competent psychiatrists. The same is true of the psychoneuroses. The experiences of the recent war, which will almost certainly be repeated in the next one, show that not only military psychiatrists but *every medical officer* should know something of the nature of these disorders and of the conditions that, on the one hand, make for their development and, on the other, for their control. When the next emergency comes, if not sooner, the Medical Department of the Army will have to meet squarely the question of its relation to the work for upbuilding morale that is certain to occupy a very large place in military affairs. Of all the sciences that throw light upon the emotional life of human beings and the deep forces that regulate human behaviour, psychiatry, in my opinion, is today able to make the most practical contribution. If that science can afford no aid in an intelligent effort to deal with morale in a military organization, there is some extraordinary difference between human reactions under uniforms and those that occur under civilian clothes.

If the Army is to utilize psychiatry in its varied medical undertakings to an extent anything like that to which psychiatry is being utilized in the world outside of the Army, some provisions must be made for the systematic training of military medical officers to work in this field. Such training must be both general and special. In the great postgraduate school for medical officers which is growing up around the Walter Reed Hospital, a psychiatric clinic, modelled after the very best civil university psychiatric clinics, will form the basis for clinical instruction in mental diseases. When its facilities are available all student officers should be required to take a series of lectures on the modern concepts of medical psychology. After this preparation (which they will find quite as useful in dealing with other sick men, women and children as with those suffering from mental diseases) all student officers should have presented to them, through strictly clinical instruction, the methods of psychiatric examination, and the more important clinical pictures of mental diseases, mental deficiency, constitutional psychopathic states and the psychoneuroses. To this should then be added practical application of this knowledge, in diagnosis and treatment and in the examination of military delinquents. Such instruction will not make them psychiatrists, but it will give future medical officers, especially if it is colored with constant reference to military situations and the special problems of the soldier, an idea of the ways in which psychiatrists can be used to the best advantage in the Army and emergency measures taken to deal with psychiatric situations when their services are not available. Before the war definite courses in military psychiatry had been established in the French and German armies.

In the light of recent experience, such instruction seems to be the minimum that should be required of all student officers. It is necessary, however, to provide, within the Army, some type of instruction for medical officers or student officers who have had their interest strongly drawn toward psychiatry and desire to fit themselves for special work in the Army in this department of medicine. I imagine that there will be no dissent from the statement that the regular establishment needs to have the important specialties adequately represented at all times in its own personnel. If there were no other reason, the retention of young medical men who enjoy military life, but would leave the service if not permitted to work along the lines of their special interests, would be sufficient, in the present shortage of medical officers. Unless special as well as general tasks in military medicine are systematically undertaken in peace, it will be useless to expect regular officers, who will occupy high administrative positions in war, to know how to use specialists to the best advantage. Hostility or at least skepticism will be their attitude if they are thrown into contact with those working in special fields with no previous association as a basis for mutual understanding and respect. It is equally important that specialists should know how to work in the Army. Many a highly trained specialist from civil life was less able to apply his skill to the actual problems of military medicine because of his insistence upon conditions that could not possibly exist in a military organization. Upon our entry into the World War, the medical officers of the permanent establishment had much more familiarity with some of the practical uses to which psychiatry and psychiatrists could be put than many great teachers in the civil profession who had been working in the most important medical centers of the country. This was on account of the frequent necessity, in the Army, of dealing with mental cases in emergency situations and because, following the recommendations of White, Richards, King, Smith, and others, definite steps had already been taken to provide the nucleus of a psychiatric service. But for the sympathetic attitude toward psychiatry—when it had practical things to propose—which existed among most regular medical officers, the important services that psychiatrists were able to render during the war would not have been possible.

In the permanent establishment, in time of peace, there are many assignments open to military psychiatrists, and there need be no fear on the part of anyone that a fair proportion of psychiatrists among the specially trained officers of the regular corps will not be kept busy in useful professional work. Recruit depots, the teaching psychiatric clinic at Washington, the neuropsychiatric wards that are essential as collecting stations and treatment centers at all large, permanent, general hospitals, disciplinary barracks and development battalions, all require the services of officers giving their whole time to psychiatric duties. The assignment of division psychiatrists, orthopedists and urologists should be continued during peace, for the duties of these officers are nearly as important in training as in active military operations. It is most necessary for them to be familiar with actual conditions governing military life and specialists from the emergency forces are much less likely to succeed in their work than regular officers who have had special training. Division psychiatrists will be found indispensable if the new regulations regarding the mental examination of men brought before general courts-martial are to be made effective. Not a little special instruction can be given in the Army by psychiatrists filling such assignments as those mentioned, but, before officers without other training are regarded as competent to serve as psychiatrists in any duty which they are called upon to perform, in the military service, they should be given the opportunity of working in some of the more important civil psychiatric centers and of becoming familiar, through first-hand observation, with the psychiatric activities being carried on in children's courts, civil correctional institutions, mental hygiene clinics and industrial mental hygiene conference centers.

With its special advantages of a controllable environment, concrete problems and continuity, under standardized conditions, of all its important activities, the Army offers a field to young psychiatrists in which there are opportunities for making advances in the study of mental diseases and conduct disorders and in the practical application of mental hygiene comparable to the advances in general hygiene, tropical sanitation and sex hygiene which have placed civil medicine under such lasting obligations to military medicine. It would be nothing short of a tragedy if the Army medical service, after having advanced psychiatry in civil life through the splendid work done during the war, should itself reap no substantial gain in one of the most promising fields of clinical and preventive medicine.

FACTORS MAKING FOR A LOW VENEREAL RECORD IN THE ARMY IN THE UNITED STATES

By Colonel P. M. ASHBURN
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IN THE *Journal of the American Medical Association* for December 13, 1919, I published a study of factors making for a low venereal rate in the American Expeditionary Forces, which study was, so far as I know, the first of its kind and, for me at least, it illuminated the problem in a helpful manner. For some months past a similar inquiry has been carried on in regard to troops in the United States. The inquiry was conducted under auspices favorable to the collection of reliable information, in that the Surgeon General lent his aid in obtaining the interest and coöperation of commanding officers and surgeons with troops in the large camps, and the inquiry was so conducted as to let every man know the reasons for which the information was sought, to assure him of his absolute freedom to answer or refuse to answer any or all questions, and to conceal his identity, so that he could not be brought to account for any answers. The answers generally appear to be true. Occasionally a questionnaire was turned in with answers so conflicting that some were certainly wrong, and a few contained replies so frivolous as to lead to their rejection, and others were rejected because the men answering were married and apparently replied in regard to the legitimate contact of marriage. The questions were sent out to thirty-seven of the largest camps in the United States on January 9, 1920. By May 28, 14,444 replies from individual *white* men had been sent in and accepted for use. The questions asked were as follows:

1. Have you had illicit sexual intercourse in the United States during the past year?
2. If so, how many times?
3. Did you always use prophylaxis after such intercourse?
4. If not, how many times did you neglect it?
5. Did you acquire venereal disease during the year?
6. Did it result from intercourse followed by prophylaxis?
7. Did it result from intercourse not followed by prophylaxis?

It will be noticed that this inquiry was limited to conduct in the United States and within a period of one year, so that it is not all necessarily conduct in the military service and, as about one-third of men now in the Army are young men who have enlisted since the armistice was signed and who had no previous service, it is probable that a portion of the replies cover periods of civilian life. All men who sent in any replies answered the first question.

CHASTITY

It is interesting and somewhat surprising to find that the percentage of men who had been chaste for a year was the same as the inquiry in France showed to have been chaste there, 34 per cent. This was surprising for the reason that the present army is the regular or professional army, recruited by voluntary enlistments, and such an army was thought to have a much smaller percentage of chaste men, and prior to the World War it almost certainly had. The change is probably attributable to the promises of education and of vocational training held out to recruits and to the attraction of a more intelligent, younger and less reckless type of recruit, and to the greater activity of moral training and of antivenereal teaching that has obtained since America entered the war. In the discussion of the inquiry in the American Expeditionary Forces I expressed the opinion that the high percentage of chastity there revealed was the most important factor in the low venereal rate. The same appears to be true here, and it is noteworthy that during the period of this inquiry, for the first four months of the year 1920, the rates averaged only half what they were in the army in the United States for five years prior to the war, and somewhat better than the weekly reports showed during the war.

This inquiry supports the earlier one in indicating that *one-third of average white American men of military age are chaste*, at least for considerable periods.

FREQUENCY OF INTERCOURSE

The 9,483 men who admitted illicit intercourse during the year acknowledged 234,413 sexual contacts, an average of 24.8 for each man. They also admitted 879 venereal infections, while 184 men refused to answer the question as to whether or not they had acquired venereal disease. It may be assumed that practically all of them had done so, in which event 11.2 per cent of all men indulging in illicit intercourse became infected in the course of a year, and there was one infection for each 220 illicit contacts. There were 117,210 acknowledged instances of neglect of the use of prophylaxis and 384 acknowledged infections following neglect of it, or one infection in 305 exposures without prophylaxis; while there were 117,203 possible uses of prophylaxis and 407 acknowledged infections following its use, or one infection for, at most, 288 exposures with prophylaxis. In regard to the remaining 31 infections, it was not known whether they followed use or neglect of prophylaxis. This finding was momentarily quite disconcerting, as it was unbelievable that the use of prophylaxis should predispose to venereal disease. The explanation was soon found in the fact that the men acknowledging the most frequent intercourse were, in general, not the greatest users of prophylaxis, and the assumption that many of them had mistresses whom they trusted seems to be justified by the figures. On the other hand, a separate inquiry limited to infected men, and which to the present embraces 7,000 cases of venereal disease, indicates that the average number of exposures in a year for each infected man was 14.5. An attempt was therefore made to divide the unchaste men into two groups, as they probably had intercourse with mistresses or with promiscuous prostitutes. For this purpose it was assumed that men having intercourse more than 50 times in the preceding year belonged to one group, and those indulging not more than fifty times to the other. Whether or not this assumption was justified, the separation of the two groups was helpful, the result interesting, and the study of the two groups much more informing than that of the undivided whole. For convenience the groups will be referred to as the high-contact and the low-contact groups.

HIGH-CONTACT GROUP

This group, consisting of men who admitted more than 50 sexual contacts during the preceding year, embraced only 1,192 men, but these acknowledged 149,373 contacts, an average of about 125 for each man. One hundred and eight men acknowledged infection during the year, or one infection to 1,383 contacts.

This group acknowledged 82,002 neglects of prophylaxis, leaving 66,371 contacts in which it might have been used, and there were 52 acknowledged infections after neglect and 54 after use of prophylaxis, or one infection after neglect of prophylaxis to 1,596 exposures without it, and one infection after use of prophylaxis to 1,229 exposures with possible use of it. The actual discrepancy was even greater than this indicates, for, as a glance at the questions will show, the men were asked to state the number of their exposures (question 2) and also the number of times prophylaxis had been neglected (question 4). The difference in the figures obtained in answer to the questions is referred to as possible uses of prophylaxis, but, as a matter of fact, question 4 was left unanswered more times than any other question, and in this group of 1,192 men there were 78 who stated that they had not always used prophylaxis but did not state how many times they had neglected to use it. So in this group the showing appears very unfavorable for prophylaxis, until it is considered that most of these men trusted their mistresses and did not use prophylaxis except when they indulged elsewhere or had some special reason for distrust. The internal evidence suggests that most men who did not stick to the truth in their answers belonged to this high-contact group, and that many of them exaggerated the number of their contacts. This group will therefore receive no further consideration.

LOW-CONTACT GROUP

Deducting the chaste men and those claiming to have had more than 50 contacts each during the year, there remain 8,291 more men who admit having had intercourse and who also admit 671 infections. But 2,332 of these men, although admitting 182 infections, failed to state how many times they had had intercourse, and practically all of them also failed to state how often they had neglected prophylaxis, the entire 2,332 specifying but 43 neglects. Eliminating these cases as useless we have 5,959 men who had less than 50 contacts each, who admit 85,040 contacts, 34,165 neglects of prophylaxis and 589 infections, thus showing an average of 14.2 contacts per man and one acknowledged infection to 144 exposures. Ninety-nine men in this group failed to state whether or not they had acquired venereal disease. The assumption that they had would bring the total of infected men in the group to 688, or 11.5 per cent of the group, and would show one infection to 123 exposures, a figure agreeing remarkably with the results of an inquiry which thus far embraces 7,000 infected men and which shows an average of 14.5 exposures during the year for each infected man. (If infected men really represent 11.5 per cent of the total, then 14.5 exposures per man would mean one infection to 126 exposures.)

Of the 589 infections admitted by this group 295 followed use of prophylaxis and 283 followed its neglect. In 11 instances this information is not furnished. There was one admitted infection after neglect of prophylaxis to 120.7 exposures without it, and one admitted infection after its use to 172.4 exposures possibly followed by its use, indicating that the use of prophylaxis reduces the liability to infection by 30 per cent. This agrees strikingly with the results shown by the inquiry answered by 7,000 infected men, in which instance the decrease of infections to exposures was 29 per cent, *i.e.*, there were 11.3 unprotected exposures for each infection without prophylaxis, compared with 15.9 exposures with prophylaxis for each infection following its use.

DISCUSSION

I regard the results of this inquiry as more reliable than those of the A. E. F. inquiry, because in that instance I received only about one-fourth of the men's papers myself and it was not possible for me to evaluate the others, because I now recognize sources of possible error which I did not then recognize, the division into high and low-contact groups was not made in the same way as here, and that inquiry covered widely varying periods with an uncertain average, whereas this covers a definite period.

As stated before, this inquiry supports the belief that chastity is the most important factor in producing low rates. It also supports the belief that chastity is largely influenced by the public opinion and, in the Army, by the official attitude in regard to it. Section ii of General Order 135, War Department, December 23, 1919, expresses a department attitude as definitely opposed to illicit intercourse, to all recognition, encouragement or regulation of prostitution; it directs all officers to support the sound policy outlined, and it calls for such frequent and explicit reports as to keep all surgeons and commanders informed at all times as to conditions obtaining in their organizations. Current weekly reports of venereal disease incidence indicate that it is having an excellent effect.

Unchaste men are no more continent in the United States than they were in France. In fact they seem to be less so, as the reported contact rate is much higher. Presumably this is due to lack of the barrier of a different language and to the constant presence of women, *i. e.*, the absence of devastated or army areas, as in France, in which women did not live. It is possible that the distracting interests, campaign, seeing strange country, visiting points of interest, very active welfare work after the armistice, were more potent in France.

Illicit intercourse appears to be much less dangerous in the United States than it was in France, although it is admitted that the means for estimating its dangers in the A. E. F. were not so good as those presented in this inquiry. It certainly appeared, though, that there was much greater promiscuity abroad than here, which would of course make for higher infection rates among both men and women. A factor of possible importance is that the attitude of American communities is much more unfavorable to the existence of houses of prostitution than is that of France.

Whether or not prohibition of alcohol will in general tend to lessen illicit sexual indulgence is doubtful, but it seems probable that it tends to reduce the liability to venereal disease by making men less reckless as to when and where they indulge, and less apt to seek women known as prostitutes.

The evidence that one-third of unmarried white males of military age are chaste for a considerable period, and that about one-ninth of the unchaste become infected with venereal disease in the course of a year, which means that about 7.4 per cent of the total become infected in a year, makes an interesting comparison with my finding that 3.22 per cent of *white* men drafted in 1918 had venereal disease.[1] This would indicate that the accumulation of the infections acquired in five months in civil life were detected at or soon after entry into the service. Although not all infections acquired in that period were detected, it is not very improbable that older cases of chronic gonorrhea and of syphilis made good the discrepancy, and each investigation is thought to support the findings of the other.

Medical prophylaxis of venereal disease appears less effective than the A. E. F. inquiry indicated, but still worth while. My estimate there was that one infection followed 30 exposures without prophylaxis or 90 exposures with it, figures varying widely from those obtained here; but it is noteworthy that Col. George Walker, as a result of an investigation covering 240,000 prophylactic treatments given in France, concluded that 1.3 per cent were followed by infection, or one infection to 77 contacts followed by prophylaxis; so it appears that sexual contacts there were really more dangerous than here. There is little doubt in my mind that the exaggerated claims made as to the efficacy of prophylaxis in the A. E. F. did harm, by removing from many men wholesome fear of venereal disease, by giving some men the idea that illicit intercourse was sanctioned, and by causing others to lose faith in prophylaxis and to cease using it when they saw many of their comrades contract disease after its use. All medical men should take to heart the lesson of the importance of having a *basis of comparison* when trying to estimate the value of prophylactic measures. A basis of comparison for American use, and which should stand until refuted by more thorough study, is herein furnished. For months it was claimed and taught that venereal prophylaxis was 99 per cent efficient because approximately only one exposure out of a hundred was followed by venereal disease after its use. According to my A. E. F. figures only 3⅓ infections per hundred would follow without any prophylaxis, and, according to this inquiry, only one in 120. The truth about prophylaxis is worth telling; exaggerations are harmful. Prophylaxis is enough efficient that it should be used after any illicit intercourse; it is not so efficient as to justify any man in assuming any risk of infection and counting upon use of it to compensate for his lack of self control.[2]

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[1] Ashburn, P. M.: "Statistics of Venereal Disease in the Army in the United States in 1918." MILITARY SURGEON, March, 1920.

[2] Ashburn, P. M.: "Concerning Venereal Prophylaxis." *J. A. M. A.*, May 8, 1920.

MEASLES AND MEASLES-PNEUMONIA[1]

By JESSE R. GERSTLEY, M.D.[2]

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IT was as a rule the good fortune of the pediatrician in the service to be placed in charge of the contagious work. And here it was that he learned the grave possibilities of measles. An ailment of relative mildness in civil life, in the Army it became one of the most dreaded of diseases and the mortality of the virulent bronchopneumonias was very high. The great problem of all medical men was, "Can we in any way prevent this complication?"

The medical world was afire with the subject of streptococcus. Reports from all the great cantonments singled out streptococcus hemolyticus. It was found in the throats, in the blood, in the empyema fluid, and in the lungs at autopsy. Time forbids reviewing all these interesting studies. Suffice it to say that observers unanimously agreed that the longer men stayed in camp, and the longer men stayed in hospital wards, the higher rose the percentage of streptococcus carriers. And with increasing pneumonia, empyema, and death, the more frequently was the streptococcus found on post-mortem examination. Indeed such fear did this germ inspire that the medical officer was led to employ most radical measures. The thorough studies of Hamburger and Fox, Levy and Alexander, and Hamburger and Mayers at Camp Zachary Taylor led to dividing measles cases into two groups upon admission to the hospital, *i. e.*, positive and negative streptococcus carriers, and the investigators fully agree that in the positive group occurred by far the greatest number of complications.

In spite of this interesting work, however, in a survey of the subject some important facts must not be overlooked.

Streptococcus hemolyticus, according to D. J. Davis, is one of the normal residents of the tonsillar crypts. It is found in many healthy adults and children. Van Dyke found it in healthy throats even after tonsillectomy. Spooner cultured medical officers at a base, and of 140 only 17 per cent were negative. Knowlton found streptococci varying from 19 per cent in the fourth week to 45 in the eighth, but in the ward with the most carriers there was least pneumonia. His figures show no relation between positive cultures and the occurrence of complications. Irons and Marine at Camp Custer found 70 per cent of healthy throats harbored the germ.

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[1] Read before the Chicago Pediatrics Society, April 20, 1920.

[2] Formerly 1st Lieutenant, Medical Corps, 1st Division, United States Army.

In addition to the almost universal presence of this organism—if one is to attempt isolation—come the difficulties with the procedure itself. Only to one who has had experience as a ward surgeon is the hopelessness of the task apparent. A gust of wind sets all the hanging sheets swinging and flapping like great fans. The medical officer leaves the ward. Masks are furtively raised and sheets drawn so that neighbors may indulge in a few words of forbidden conversation. The new orderly, assigned to the service because he was wounded or gassed and thus unfit for much physical work, energetically sweeps up a great cloud of dust, and the ward-master sprays all throats with the same atomizer. The medical personnel itself, worn and exhausted in all but spirit, cannot possibly take the necessary precautions to prevent carrying contagion from bed to bed. I doubt if any medical officer actually believed that conditions as they existed permitted perfect quarantine of the patient.

Thus if one is to do away with measles-pneumonia by excluding the streptococcus two difficulties arise.

1. The organism is almost universal in its distribution.
2. Conditions in most hospital wards prevent absolute isolation.

But still more points must be considered. Brand in a historical review shows that from the early part of the sixteenth century the herding together of men as occurs in large armies always gives rise to epidemics with frequent pneumonia and empyema. Friedman and Vaughn at Camp Sevier report complications due to the pneumococcus, Dick at Camp Pike found 48 per cent of pneumonia due to pneumococcus and 46 per cent to streptococcus, many of which were non-hemolytic, and Blanton and Irons at Camp Custer on post-mortem found 142 streptococcus and 78 pneumococcus pneumonias. Sellards and Sturm report that twenty-five of thirty-one measles patients harbor influenza bacilli, while Lucke from pathological studies believes there is a specific measles-pneumonia independent of all the above organisms.

If we accept all the above facts, what shall we do to prevent the occurrence of pneumonia? If continued investigation shows disease germs present in ever increasing numbers and varieties, and if conditions of overwork, exhaustion, exposure, overcrowding, and poor food make men susceptible and give organisms increased virulence, what method of quarantine could possibly be successful and why doesn't every patient succumb to pulmonary disease?

There is, however, another way of attacking the problem, one which came to me as I contrasted different methods of infant feeding. In seeking causes of nutritional disturbance many pediatricians searched solely for microörganisms, many concentrated entirely upon milk modification, but those giving our most effective knowledge arrived at this by careful clinical study of the baby. Why not, then, study and seek anatomical or physiological predisposing causes rather than bacteriological? Points to be considered in such a study (and I presume the more thorough the study the greater number of factors to be considered) were:

1. Location of the patient in the ward—
    (*a*) With reference to other pneumonia patients.
    (*b*) With reference to windows and radiators.
2. History of the patient before admission—
    (*a*) With reference to his organization, hardships, exposure.
    (*b*) With reference to previous disease especially pulmonary.
3. Subjective symptoms before admission, *i. e.*, appetite, cough, frequency of cough, nature of cough, its source whether from throat or chest.
4. Condition of the nasopharynx.
5. Adenopathy.
6. Rash.
7. Chest, *i. e.*: (*a*) rachitic or emphysematous type; (*b*) lungs —boundaries, râles; (*c*) heart.
8. *Condition and general impression of the patient upon admission.*

These studies I continued whenever time and opportunity allowed and from an experience with several hundreds of measles cases have drawn the following conclusions.

Nearly all patients developing pneumonia came from one organization which was new in camp, had been riddled with disease, and consisted chiefly of men from the country. The patients gave definite history of previous lung disease, bronchitis, pneumonia, or asthma, or else showed bronchopneumonia upon admission. Others have alluded to this also. Schnabel working with Friedman found histories of preceding bronchitis and Blanton and Irons suggest this to be a factor. My patients showed this definitely, the following being typical.

Private X is thirty years old. Weight 130 lbs. His father died of asthma and heart trouble. His sister died of tuberculosis. He has never been sick except for coughs and colds which he gets three or four times yearly. Two years ago he had a very bad attack. He has been sick for three weeks. He took cold one night when he had insufficient blankets and was on sick call for a week. Then he was put to light work in the convalescent squad but never felt well and so was sent to the hospital. Examination showed a mouth full of Koplik spots.

Location in the ward was unimportant as regards other pneumonia patients. Some of those developing complications were placed near radiators and windows.

Subjectively those patients who were predestined, were most miserable with high fever, anorexia, painful red throats with or without tonsils, dyspnea, and frequent exhausting, distressing painful cough arising from the chest.

Physical examination often suggested some thoracic anomaly. Some had markedly rachitic chests, some asthmatic or emphysematous, and some had bronchopneumonia upon admission coincident with the measles. An emphysematous chest is one to fear.

Lastly and most important is the general impression of the patient. This in a way has been alluded to by Hamburger and Mayers. With a little practice, almost at a glance one can foretell those doomed. I liked to think of it as the mental side of pneumonia and empyema. The following note in my diary describes them all.

> Like the other pneumonia patients he has been drilling and "hiking" in spite of a bad bronchitis. Like the others, too, he seems doomed from the start. He talks with a high disinterested voice as if he has given up all hope and has the facial expression of one weary and worn, one with little nerve force left, a man who yearns only for rest.

This mental attitude, a sort of apathy, was characteristic of them all.

To conclude then: Whether measles-pneumonia is due to streptococcus, pneumococcus, influenza bacillus, or specific measles virus, by far the greatest number of patients are immune to this complication. To some, however, it seems inevitable. Such are overworked, exhausted men who have suffered previously from pulmonary disease, who show abnormalities in the bony thorax or its contents, and who seem in a way mentally predisposed.

Instead of trying to avoid complications by culturing and quarantining what might be 100 per cent of those examined wouldn't it be wiser in case of future epidemics to give special attention to the *susceptible* ones? Put them in an isolation that would be real. Be especially careful as to the heating and ventilation, and let the attendants be particularly cautious as to their own personal asepsis. This seems to me at present the most practical way of attacking the problem.

In view of the present measles epidemic it will be interesting to note whether some children as well as adults seem constitutionally predisposed to complications.

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A CASE OF MULTIPLE ECHINOCOCCUS CYST[1]

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(With one illustration)

ECHINOCOCCUS cysts are so infrequently met with in our service as to be worthy of report. The case here described is interesting both from a pathological as well as an operative standpoint since the patient was under long observation on both the medical and surgical services at this hospital, was finally operated upon and ultimately died of the disease which could not be wholly eradicated even by the most extensive surgical measures.

G. A., Private of the Medical Department, aged 24, and of Italian birth gave a history of having been well until September 10, 1918, on which date he had a fall, striking his abdomen, after which there was a slight soreness for some twelve days followed by a more severe pain in the region of the liver. He remained in hospital at this time about two weeks and was then discharged. In February, 1919, he was discharged from the service but reënlisted in November, 1919. A few days after his reënlistment, while drilling at double time, he fell from exhaustion and almost immediately complained of severe pain in the right side near the liver. He remained in hospital at Camp Devens until December 11, 1919, and was then transferred to General Hospital No. 41, Fox Hills, N. Y. At his transfer it had been noted that there was a hard immobile mass, slightly tender to pressure, in the right upper abdominal quadrant and that the liver was soft and tender on pressure. The transfer diagnosis was "hypertrophy of the liver."

On admission to General Hospital No. 41, the man was walking but with some dyspnea and the report of his examination showed a prominent abdomen, liver hypertrophy and a much enlarged spleen. From that time on until he was transferred to the surgical service, he showed progressive emaciation, poor color, a gradually increasing soreness in the right chest and side, and headache and malaise. He also had occasional night sweats and was troubled by pruritus. There was no jaundice. All examinations of the feces, blood and urine were negative as far as throwing any light on his case. The Wasserman was negative On February 15, 1920, he was on the surgical service for an exploratory operation, a tentative diagnosis having been made either of abscess of the liver or of echinococcus cyst. The latter diagnosis was made and adhered to by a young medical officer who had really nothing to do with the case, but it was the correct one and I was not positive enough to commit myself in advance of the operation. It had been planned to do the operation about February 23, but a sudden and rapidly increasing jaundice caused us to operate several days earlier, on February 20. At the operation, which was done under gas-oxygen, an incision was made through the right rectus over the site of the hard tumor which could be felt through the skin. On opening the abdomen the tumor presented in the wound and was about the size of an indoor baseball. It was rather white and smooth and appeared to arise from the peritoneum over the right kidney and it was attached to the liver. It was freed from the liver by cutting between clamps and was finally shelled out of its bed entire and without rupturing the sac. The bed bled freely which was controlled by packing. The next thing that arrested the attention was a gall-bladder of enormous size, and greatly distended, perhaps to the size of a teacup. It was seized and dissected away from the liver subperitoneally and with a great deal of difficulty. After the contents had been emptied, it was clamped off at the junction of the cystic with the common duct. As there was much bleeding this had to be done quickly and entirely by the sense of touch. The bleeding was stopped with some difficulty and the man's condition at this time precluded any further operative work or exploration. The wound was closed except for several drains to the tumor bed and to the region of the gall-ducts since,although no obstruction could be felt in the common duct, the fact of jaundice being present and the gall-bladder having been removed made it quite likely that a biliary fistula would result and this is what occurred.

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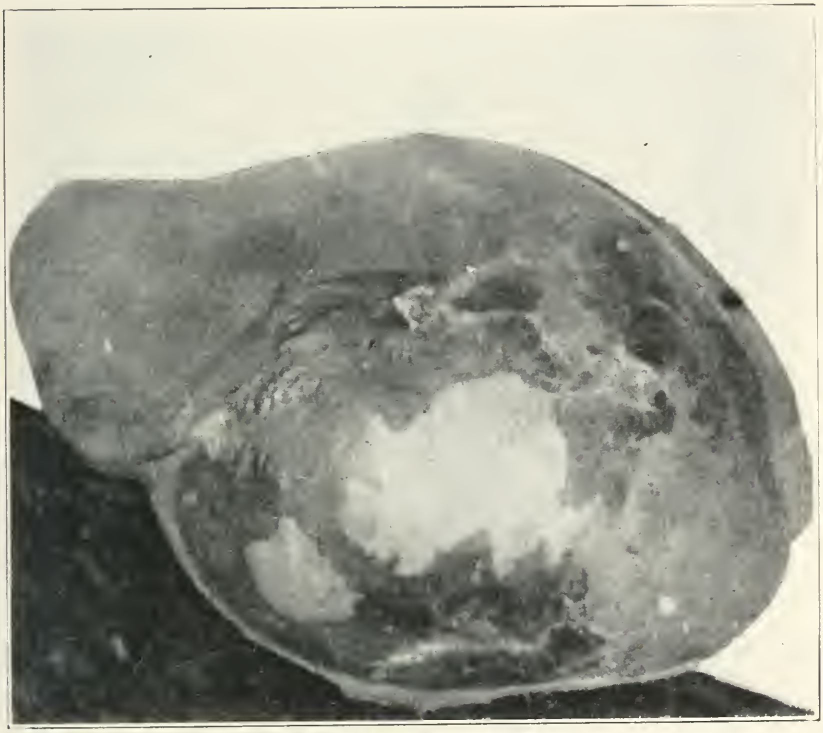
[1] From the Surgical Service, General Hospital 41, S. I., N. Y.

The man made a good recovery from the operation and within twenty-four hours he begun to drain a great deal of bile from the wound. For the first three days he passed no bile or very little into the intestine but after this his bile ceased to drain from the wound in any considerable quantity and the stools became bile-stained. The preliminary report of the pathologist diagnosed the case as one of echinococcus cyst of the liver. This report, made by Maj. Charles Sinclair, M. C., is as follows:

> Tumor removed was 2 by 2½ inches, surrounded by connective tissue capsule, showing on surface fluctuant nodules by protrusion of capsule. Nodules all appear to be weak areas in fibrous capsule. On section are seen to be following elements: (1) Fibrous tissue capsule, 3 mm. thick, composed of reticulum of fibrous tissue, dark brown color thinned at areas of bulging; (2) just inside No. 1 is a thin white membrane (mother cyst) having a smooth, shiny outer layer, and a granular inner surface; (3) cysts (daughter) contained within mother cyst (200-300) of variable size, from pea to walnut size. Composed of thin white cyst wall containing a clear colorless fluid. In daughter cysts are found large numbers of hooklets, and also a few scolices of echinococcus.
>
> Pathological diagnosis of enucleated tumor; echinococcus cyst of liver.



Echinococcus Cyst of Spleen.

(To face page 220.)

Following the operation there was a very irregular temperature-curve although for a few days the man's condition seemed better. He developed a biliary fistula within 48 hours and although for three or four days not much bile appeared in the stools, eventually the discharge from the wound became less and bile reappeared in the stools. The patient's jaundice cleared almost entirely but he became weaker and weaker and died twenty-seven days after the operation. The autopsy disclosed a very large cyst of the spleen of which a photograph accompanies this paper, multiple cysts of the liver, an empyema of the right pleural cavity from a rupture of one of the abscessed cysts through the diaphragm and the common duct filled with detritus from a cyst. This last accounted for the intermittent jaundice which was never permanent, the duct allowing some bile to pass at intervals.

The full report of the pathologist is as follows:

Inspection of Body.—Man of 66 inch height, 115 pounds weight, musculature and nourishment poor. Rigor mortis firm. Marked hypostasis. General yellowish tint to skin, yellowish tint to sclera. Abdomen distended. Slight edema of ankles. In right hypochondrium is a vertical incision 2½ inches long, gaping 2 inches, draining a greenish-yellow, thick fluid of fecal odor.

Thorax.—Left lung and pleural cavity negative. Weight of lung 407 grms.

Pericardial Cavity.—Contains 300 c.c. clear straw-colored fluid.

Heart.—Normal size. All chambers contain fat clot. Right ventricle slightly dilated and flabby muscle. Tricuspid valve 12 cm. circumference. Pulmonary valve 7 cm. Cusps negative. Left ventricle wall 15 mm. thick. Mitral valve 9 cm. Aortic valve 6½ cm. Cusps negative. Small patches of sclerosis on ascending aorta.

Right Pleural Cavity.—Entire cavity filled with thick, greyish-yellow fluid containing curds and caseous masses, foul smelling of distinct fecal odor. Lung is contracted down to small size (weight 320 grms.), loosely adherent to diaphragm, and covered with yellow caseous matter. Diaphragm level at fourth intercostal space, and at center of dome of diaphragm is a gangrenous area, through which pus exudes from large liver abscess directly beneath. Small cysts are also seen to flow into pleural cavity from liver abscess. Empyema pus contains staphlococcus.

Abdomen.—Abdominal panniculus very scanty, 2 mm. thick, fat is of orange color. Rectus muscle is very atrophic, 3 mm. thick. No free fluid in peritoneal cavity. No sign of peritonitis.

Stomach.—Distended, contains black, curdy fluid, reacting to blood and bile. Pyloric end of stomach is adherent to and forms wall of fistulous tract to bile duct region.

Duodenum.—Distended, contains small amount of bile-containing matter. No communication can be detected between intestine and the biliary fistula.

Liver.—Weight 2,480 grms. Enlarged. Presents the following pathology:

1. Abscesses: Dotted with miliary abscess, numerous abscesses size of walnut, and in right lobe a large abscess divided into two parts: (*a*) upper, 3 inches diameter, containing thick foul smelling pus, and ragged wall of necrotic liver substance, opening into pleural cavity through diaphragm above, and with lower cavity below by a circular tract ½ inch in diameter; (*b*) lower, 2½ inches diameter, of same

character as upper, bulging into inferior surface, being there covered by a thin layer of liver capsule. This cavity has a large and direct communication with the primary subdivision of the dilated hepatic duct. Echinococcus hooklets are found in material from abscess wall.

2. Cyst: 2 inches diameter; at lower border of right lobe, and 2 inches from gall-bladder notch, firmly imbedded in liver tissue. Consists of outer fibrous capsule, 3 mm. thick. One inner white thin capsule (mother cyst) containing many daughter and granddaughter cysts of varying size, in which are found the scolices and hooklets of echinococcus.

3. Liver: Substance is pale and mottled in right lobe, necrotic in many places. In left lobe, on cut section, bile oozes as if retained by obstruction in passages.

4. Bile Passages: Gall bladder has been removed surgically.

Cystic Duct has been severed close to its entry into common duct, with open drainage through it into the surgical fistula.

Common Duct is dilated to diameter of 2 cm. and containing white membranous material resembling the cyst walls of echinococcus cysts. The hooklets of echinococcus are found within this duct, also one small unruptured cyst.

Hepatic Duct, distended to 2 cm. diameter and also containing the ruptured echinococcus cysts. Primary subdivision passes into lower abscess cavity.

Note.—The liver picture indicates that the large abscess cavities were originally echinococcus cysts, which ruptured into hepatic duct, the membranes being retained in the hepatic and common ducts—the ruptured cyst became infected, and then progressed as a liver abscess, symptoms being referable to (1) live abscess, (2) obstruction (cyst membrances) of the ducts.

Spleen.—Weight (including attached cyst) 1,700 grms. To upper posterior wall is fixed a large mass, arising from spleen capsule. Spleen proper is considerably enlarged, 17 cm. by 9 cm. by 3 cm. The cyst is 18 cm. by 14 by 14, firm but not hard, with fluctulant areas, pressure on one side is transmitted to other side. Color, brownish with clear, white, irregular areas. This cyst is manifestly an echinococcus cyst of spleen capsule. It is preserved as a gross specimen and contents not explored·

Left Kidney.—Weight 192 gm.; negative.

Right Kidney.—Weight 160 gm.; negative.

Pathological Diagnosis.—(1) Echinococcus cyst of liver, multiple; (2) echinococcus yst of spleen; (3) abscess, liver, multiple; (4) empyema, right, from ruture of No. 3 through diaphragm; (5) dilatation and obstruction of bile passages-echinococcus.

Cause of Death.—Sepsis.

Blood count	*Red*	*White*	*Small mono.*	*Large mono.*	*Poly.*
December 13	......	9,200	20	6	74
December 17	4.3 m	11,500	12	8	80
December 29	4.3 m	11,900	16	6	76
January 11	3.3 m	13,000	6	19	74
January 23	2.6 m	7,300	16	8	76
February 18	3.9 m	16,400	1	3	96

Note.—No eosinophilia found.

X-ray Reports.—December 26. Hypotonic stomach with gastroptosis and muscous colitis; January 14. Right diaphragm slightly higher than left, very limited movement on breathing.

Temperature Curve.—Normal to February 18 (102°) returning to normal in few days; then had evening temperature with normal morning to March 9, when the following morning records were noted:

Date	*Temperature*	*Pulse*	*Respiration*
March 9............	102°	134	20
March 11...........	100°	120	28
March 13...........	100°	120	28
March 14...........	98° (ax)	120	28
March 15...........	98° (ax)	120	40

Postoperative Conditions.—Drains placed in at operation removed after several days leaving a large fistula, draining yellowish bile stained material having a fecal odor, and in which colon bacillus was present. General condition progressed in septic state to death on March 16.

At the autopsy it was quite evident to all of us how hopeless the case was from the start and it was difficult to see how the individual had survived so long. A single cyst, or perhaps more than one, might be eradicated with some chance of ultimate cure, but not such a collection as was present here. In the Army of a few years ago echinococcus cyst was practically unknown but now one may expect practically any disease to appear sooner or later, and it is just these rarities that medical officers must be on the watch for.

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EMERGENCY MEASURE AND FORESIGHT IN MALARIA CONTROL[1]

By Surgeon L. D. FRICKS
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THOSE of us who are particularly interested in malaria control and can look a little ahead of the present day to the time when malaria will not be such a barrier to commercial development and good health as it now is in many parts of our country, feel that two important points to be considered in the general problem of malaria elimination are:

That we have not yet demonstrated the importance of the project to a sufficient portion of our public, so that they will be willing and actually ready to coöperate actively in public malaria control; and secondly, that when new projects are undertaken the directors of malaria-control operations too frequently are unaware of special measures which were applied years ago and would be suitable for the conditions surrounding the new undertaking, and therefore they apply general control methods and secure less satisfactory results.

It has been noted that villages from which towns have grown, contractors' camps, villages of employes of industrial plants, and more recently military and naval camps have been located in districts particularly favorable for propagation of malaria mosquitoes, even when far more suitable areas existed nearby—in fact, it may be said that the necessity for emergency malaria-control measures is frequently created by lack of knowledge or by causes that should have been foreseen.

Should the necessity again arise to mobilize troops and establish camps in the southern states, say three or ten years from today, would the question of proper malaria control be given due consideration in connection with the preliminary survey or final selection of the military and naval cantonments or war industry plants? And should it become absolutely necessary to locate a camp in a highly malarious district, would funds be immediately available for doing efficient mosquito-control work promptly within the area requiring treatment in order to keep the military forces free of malaria?

Such provisions were neither anticipated nor provided at the beginning of the recent mobilization of American troops. A serious emergency was created due to lack of foresight and adequate preparation. As a result, it happened that in some instances men from malarious districts slept in tents close to men from nonmalarial states, while engorged anopheles were found quite numerous in many of the occupied tents. Emergency control measures under such circumstances were of vital importance.

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[1] Read at meeting of the Association of Military Surgeons, New Orleans, La., April 22–24, 1920.

Within a very few years undoubtedly there will be an increase of commerce between the United States and the nations to the south of us. It will follow that American capital must help to develop the natural resources and manufacturing industries in those countries where malaria now prevails. Will the residences of the employes or camps be so located that the employes will be fairly free from malaria, or will the corporation directors find later that their labor is unfit and profits unsatisfactory because of malaria incidence, or even be suddenly confronted with a large labor shortage and corresponding financial loss?

Why not anticipate the emergency by having a preliminary malaria survey precede the final acceptance of the location of the camp, cantonment or industrial plant?

Let me invite your attention in a very few words to certain precautions which should be taken when locating a camp site near a large body of water. In selecting the location for a camp or group of habitations, we should look twice at bodies of water that are apparently nonpotential production areas of anopheles, otherwise we may inspect without seeing hidden dangers. Two items that are most frequently overlooked are seasonal floatage and certain forms of aquatic vegetation. A pond or lagoon may be under perfect fish control until algae and aquatic plants appear or leaves begin to fall, then the fish-control value may be reduced 90 per cent or more in a period of a few days, and this change be overlooked until the adult anopheles appear in numbers in the houses.

Again in fresh water subject to tidal action, such as the upper Potomac in Virginia, the floating eel grass and other aquatic growths may cause at irregular intervals the production of more anopheles per unit of area than occurs in the Arkansas rice fields which are recognized as the ideal areas for profuse production of *Anopheles quadrimaculatus*. The landman looking at a camp site on the banks of the Potomac might think such a body of water absolutely free of mosquito production and yet with a change of wind might find a few hours later acres and acres of wind blown or tide borne floatage along shore in which millions of anopheles larvae were present in all stages of development. He might camp on one spot for a month and see but few anopheles, and a week or two later have his tent visited by thousands each night. Of course it would be possible to broadcast the floating rafts of eel grass with oil-soaked sawdust as was done at

Quantico, Va., but if the area to be controlled exceeds a square mile or more, not only is it costly but if every square foot is not thoroughly treated at proper intervals, the results will be unsatisfactory.

No matter how difficult the malaria problem or emergency may appear, there is usually a solution if determined and concentrated effort is made to find it. The frequent emergency conditions which arose or were foolishly created during the construction of the Panama Canal before the sanitary officials were given proper authority are described in "Mosquito Control in Panama." [2] Similar as well as new emergency problems will arise with other species of anopheles and must be solved by sanitarians wherever malaria control on an extensive scale is undertaken. We will do well then to consult all sources of information and combine the findings of others with a bountiful supply of common sense in handling malaria control emergencies.

Assuming that it became necessary for you to take charge of control operations in a highly malarious district, it would be natural to think first of drainage operations. However it takes time to make necessary surveys, obtain funds and suitable supplies, such as may be required to properly handle the situation. Again it may not be possible to complete drainage operations before the malaria season reaches its height; and the oiling of water surfaces may not be practical or oil and larvacides may not be available for the time being. Such conditions are not unusual—in fact, frequently arise and must be met.

In a mosquito ridden district, with a high malaria rate among the native population, the new arrival's first thought of protection usually is to secure a cotton mosquito net for his bed. The number of persons who can sleep under a mosquito net without being bitten where the bedroom is heavily infested with anopheles is surprisingly small. It is a good general plan for the public to use mosquito bars, but they should be educated in their use, and unless considerable care is exercised, the supplying of mosquito nets to enlisted men in newly erected camps may not result in the expected protection from malaria.

Provided a double bed is available, and a person sleeps out of contact with the net all night long and provided the netting is never torn and its lower portion always carefully tucked under the mattress all the way around, it will be effective. Such requirements are seldom fulfilled, however, and many people deceive themselves regarding the value of bed nets as a protection against anopheles, probably because the nets give a relief from annoyance caused by other kinds of mosquitoes. It would be most interesting to determine how many men of a company sleeping on mosquito bar protected cots are bitten by anopheles through the bars during a period of thirty nights, and also how many who were bitten by anopheles while asleep would be aware of the fact the following morning.

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[2] "Mosquito Control in Panama." G. P. Putnam's Sons, New York.

Another point of importance—if mosquito bars are issued to one hundred persons selected at random, how many will be without holes or mosquito doors of entry at the end of thirty days? We know that certain anophelines are far more persistent in trying to find entrance into a screened house, room or space enclosed by a mosquito bar, than are most other kinds of mosquitoes—also that the mosquito net itself, like the spider web, is a preferential resting place for this particular species.

As to the practical use of the bed mosquito bar, the best that can be said is that it affords a certain kind of protection to a sleeping person, that it is sometimes effective—but very often not a protection against malaria. It frequently increases the chances of a good night's rest and therefore as a convenience is worth something, but as a practical prevention of malaria its value is yet to be proved. To be of practical value it must be properly used and frequently inspected. In many of our southern towns sufficient money has been spent buying mosquito bars for beds, to have drained all nearby mosquito breeding areas, thus driving the malaria mosquito out of town for all future time.

Salves and solutions applied as a protection against mosquito bites frequently are as repulsive to the user as to the mosquito itself, and as they are effective for short periods only, their use is not satisfactory against night feeding mosquitoes such as the anopheles. In fact they may do great harm by lulling the victim to sleep and thus insuring his being bitten and infected.

What can we do then if malaria conveying anopheles are numerous, malaria carriers abundant, drainage, oiling and screening as yet incomplete, and our non-infected men sleeping not far from the carriers? Quinine must be depended upon here, and given freely both for its curative and prophylactic effect. But there are other simple emergency measures which may be employed pending the completion of oiling, drainage and screening operations. A close study of the problem has shown that habits common to many anopheles may be used to advantage by sanitarians in practical malaria control. The following are examples:

(1) After many species of anopheles become engorged they rest on the wall or other suitable shaded resting places relatively close to where they obtained their blood meal, and are not apt to fly far for a considerable interval after being engorged with blood.

(2) Those which have digested their meal and are in a condition suitable for sustained flight are most apt to depart from their resting

place (enclosure or house) either (*a*) just after dusk or (*b*) soon after daylight.

(3) In a screened building, the anopheles ready to depart collect on the screen doors or screen windows during these periods, and with a little care and practice practically all of them may be destroyed. They are apparently more anxious, while on the screens,to escape from the building than from the person who is destroying them.

(4) The recently engorged anopheles that are at rest in the building are relatively easy to destroy. If they are close together a chloroform bottle or the Griffitts catching tube may be used to advantage for collecting them, but ordinarily the common fly swatter will be found of more practical use.

(5) Light colored walls make the destruction of anopheles an easier task. On dark surfaces or in relatively dark rooms or enclosures a flash lamp is an advantage in obtaining perfect results.

By taking advantage of the mosquito habits mentioned above we can employ an emergency control measure of decidedly practical value —the destroying of engorged malaria mosquitoes. It is not sufficiently well known or would have been more widely employed. You may want to know what results may be expected from such a procedure:

During the construction days of the Isthmian Canal, Gorgas made practical application of this measure on a large scale as other control operations were often not available. His results were highly successful and have been published. In one case where a railroad laborers' camp was located close to a detachment of the U. S. Marines, with the laborers' camp at the edge of an extensive anopheles producing swamp and the Marines 200 yards distant on top of a hill in screened barracks, the malaria sick rate among the U. S. Marines was forty-two times as high as among the railroad laborers. The above-described emergency method was applied at the railroad laborers' camp, but not at the camp close by occupied by the military forces.

During the period of relocation of the Panama Railroad, the jungle was being flooded with rising waters of Gatun Lake, thus making an ideal breeeding area for anopheles. Laborers' camps erected near by in native villages containing many malaria infected persons were strung out along a 20 mile line. In the villages and camp buildings the above measures were applied. The total result was a lower sick rate among the laborers living in the flooded lowlands than among laborers doing the same class of labor and living in the up-hill country. Moreover, during a period of several months the anopheles captured in the lake region were taken alive and sent to the laboratory for dissection and no infected specimen was found—indicating that for all practical purposes the daily catch emergency control method was decidedly effective and that all anopheles which were collected were caught before they had time to become infected.

Similar results were obtained during the historic flight of anopheles at Gatun in 1912, when *anopheles tarsimaculata* were so numerous that the clerical force was compelled to cover the cane seated chairs with blotters and use paper leggings held in place by elastic bands as protections against these hungry hordes.

These methods were also used at Cocoli Spillway Camp at Miraflores and again at Carazol, where as many as 1,100 anopheles were caught in a single night in properly designed mosquito traps installed in the screened ventilation openings on the leeward side of barracks.

More recently at a farmhouse of poor white people on the coastal plains of Georgia, where the little children of the family were badly infected with malaria, listless and apparently unused to enjoying life, the greatest excitement and interest was aroused when a play game was invented to capture the gorged anopheles resting on the walls of the bedroom and porch—there was lively competition to see who could get the most mosquitoes and in a few minutes the children were laughing and thoroughly enjoying the work.

We all realize that there are many methods of anopheles control. We all hope that in the near future better, more economical and more satisfactory methods will be devised, but are we fully prepared, upon receipt of orders to take charge of and assume full responsibility for malaria-control measures around a newly located camp, to take advantage of such practical knowledge as has already been acquired by days and nights of hard work on the various phases of malaria control spent by former investigators? We should be. We owe this much to the soldiers and sailors who may be placed under our protection.

The emergency measure described above of destroying engorged anopheles mosquitoes both in screened and unscreened buildings was perfected by Senior Sanitary Engineer J. A. LePrince and is deserving of more wide spread publicity and general application than has been given to it. It depends for its success, of course, upon the habits of the anopheles mosquito and the life history of the malaria plasmodium. At its first bite the mosquito never carries but receives infection, and it is only after the lapse of more than a week's time that the plasmodia, having passed through their developmental stages in the mosquito, are capable of infecting a human host through injection at a subsequent bite.

This method of hand catching or destroying engorged anopheles mosquitoes is simple, it has been proven to be effective, and it is believed to be worthy of your careful consideration when confronted with an unusual emergency in malaria control around a recently established camp.

OCULAR SYMPTOMS OF ENCEPHALITIS LETHARGICA

By Major EDMUND B. SPAETH

Medical Corps, United States Army

THE following is a brief résumé of five cases of encephalitis lethargica reported only from an ocular standpoint. While the total number of cases here reported is not sufficient for any deductions as to percentage of cases of lethargic encephalitis developing ocular symptoms, also the variety of symptoms presenting, still the fact stands that all of the cases seen did have various ocular symptoms.

Case 1.—Sgt. G. Age 24. White. First seen February 17, 1920.

External examination.—Bilateral dilated pupil, the left pupil the larger of the two. Reactions to light and accommodation very sluggish, that to accomodation being hardly present. External muscles all normal with the exception of the internal recti. These show impairment of about one-fourth normal with prism tests as compared to the external recti. No diplopia. Fundus shows a mild bilateral optic neuritis. Ocular tension normal. Vision bilateral approximately 20/70. Visual fields were those of a true optic neuritis. As convalescence occurred patient developed "dancing eyeballs" which at times became a true mystagmus to the right, more marked when looking to the right. Recovery with 20/20 vision each eye. Normal muscle balance, and extent of visual field normal withthe exception of a very slight amount of contraction of temporal halves of fields.

Case 2.—Mrs. W. Age 44. White. First seen May 30, 1920.

External examination.—Pupils slightly dilated but equal. Reaction to light normal but to accommodation very slight. Moderate amount of convergence insufficiency bilateral more marked right eye. Vision bilateral 20/20. Ocular tension normal. Near Point (PP) right eye 29 inches reading test type 1.5 D. PP left eye 24 inches reading test type 1.5 D. Fundus examination showed no interocular pathology. Principal complaint typical of presbyopia but a plus 1.75 sphere which had been sufficient for comfortable reading prior to her illness was now quite inadequate. New lenses were given and proper muscle balance was readily regained with muscle exercises.

Case 3.—Capt. R. Age 28. White. First seen March 23, 1920.

External examination showed bilateral paralysis internal recti with diplopia. Pupillary reflexes all normal. Ocular tension normal. Fundus examination showed no interocular pathology. Vision right eye 20/70 corrected to 20/20 with minus .75 sphere with minus 1.25 cyl. axis 90°. Left eye 20/70 corrected to 20/20 vision with minus .75 sphere with minus 2.75 cyl. axis 90°. After treatment patient was discharged from the eye service as cured May 28. At this time muscle balance was normal, in fact slightly over corrected.

Case 4.—Lieut. D. Age 28. White. First seen April 25, 1920.

External examination showed much impairment of function of internal recti bilateral with complaint of constant diplopia. Type of diplopia in this case as well as in case immediately above was that of internal recti paralysis. Pupils large but equal. Pupillary reflexes all sluggish, reaction to accommodation being especially slow and weak. PP right eye 20 inches reading test type 1 D. PP left eye 20 inch reading test type 1 D. Fundus examination showed no interocular pathology.

Patient discharged from eye service as cured June 7, 1920. Lenses for near vision givèn right eye plus .50 sphere with plus .25 cyl. axis 90°, left eye plus .50 sphere with plus .12 cyl. axis 90°. Vision without lenses bilateral 20/20. Muscle balance normal upon discharge.

Case 5.—Gen. C. Age 41. White. First seen April 10, 1920.

External examination showed bilateral lagopthalmos with beginning corneal ulceration. Pupils widely dilated. Pupillary reflexes to light and accommodation both sluggish. Complaint of blurring of vision. This could be caused by condition of corneal epithelium. Almost complete loss of function internal recti bilateral with diplopia. Apparent limitation of motion of external recti judging by the amount of abduction of eyeball bilaterally. Corneal sensitiveness much decreased. This was almost to the degree of anesthesia left eye. Ocular tension practically normal. Fundus examination showed no interocular pathology. Vision right eye 20/20, left eye 20/30. Accommodation was not accurately measured but PP each eye was more than 24 inch reading test type 1 D. In addition to these above symptoms the following signs and symptoms in this case are mentioned. While not ocular they were all definite and interesting. Impairment of smell. Bilateral facial paralysis. Nerve deafness not complete left auditory nerve. Fine constant tremor of the tip of the tongue with impairment of taste at the tip of the tongue. No hoarseness. No impairment of function of sternomastoid or trapezius muscles. Diastolic blood pressure much increased giving a high pulse pressure. June 7, case still under treatment but improving rapidly. At this time case still showed some involvement of third, seventh and eighth cranial nerves.

Of these above cases Nos. 3 and 4 were most acutely ill, for from five to six weeks. Case No. 1 was somewhat less so, although the lethargy was more marked and was accompanied by much delirium. Case No. 2 was less ill than No. 1. Case No. 5 was least acutely ill of all of the cases and had fewest mental symptoms. In this last case, however, the attending surgeon who had charge of the case, prior to its admission to the hospital, reported that the patient had been unwell with attacks of lethargy not marked for about four weeks before it became necessary to admit him to the hospital.

The treatment of these above cases was in no way new. Hydrotherapy, electrotherapy, prism and other muscle exercises, atropine and heat, were the principal forms of treatment. One fact was impressed firmly upon my mind through the treatment of these cases, that great care must be taken as to treatment during the acute irritant stages of the disease.

Case No. 1, which had had no diplopia, developed a brief two-day transient diplopia following a too vigorous series of prism exercises for convergence insufficiency, and Case No. 5, following his first two electrotherapy treatments, complained of great pain with an increase in the blurring of vision.

THE AMERICAN RED CROSS ASSISTANCE TO THE UNITED STATES MEDICAL DEPARTMENT IN THE UNITED STATES

By Lieutenant Colonel H. C. CONNOR
Medical Corps, United States Army

THE participation of the American Red Cross in the medical and surgical work of the Medical Department of the Army has been largely confined to work overseas; it is believed that the Red Cross has been helpful in the organization of hospitals, hospital units and ambulance companies which were absorbed into the regular medical service as soon as they were got into working order.

The Red Cross work, in the United States, has been along auxiliary lines, such as the Canteen work, the Women's Motor Corps work and the Camp Service. The Red Cross has been the medium, to a very great extent, through which the women of America have been able to contribute their share towards winning the war and it has afforded them a systematic, organized means of accomplishing this purpose. The vast amount of labor, material and money contributed by the American people to the American Red Cross was an actual demonstration of how unitedly the people were backing up the Government to carry on the great war to a successful conclusion.

A description of the various Red Cross activities follows. In all its efforts the aim of the Red Cross has been to help where help was needed and not to interfere with the routine of Army regulations.

Prior to the declaration of war by the United States with Germany, the American Red Cross had organized a Department of Military Relief, the function of which was to render assistance from the Red Cross to the Medical Departments of the United States Army and Navy. This department was directed by Brigadier-General Jefferson R. Kean (then Colonel, Medical Corps, U. S. Army), who was the originator of the Department and to whom the credit is due for the work of the Red Cross in the early days of the war, since it was owing to his foresight that the Red Cross had adopted a concrete plan of preparedness for war by organizing base hospitals in connection with a number of the large civilian hospitals and medical schools in various cities in the country.

Each hospital was based on the organization of the Army Base Hospital, and the personnel taken from the staff of the parent institution, in this way, a working organization of personnel, all familiar with the same methods and technique was secured, and each individual assigned to the type of duty for which his special professional training had fitted him.

Equipment was secured at the expense of the Red Cross, most of it being purchased from funds donated by individual friends, either of the hospital or of the local Red Cross Chapter. The choice of equipment was based on the Army supply tables, was selected by the Director of the Unit and was stored, complete in every detail, in preparation for future emergency.

The medical personnel were given commissions in the Medical Reserve Corps, the enlisted men enlisted in the Enlisted Reserve and the nurses enrolled in the Red Cross nursing service, ready for transfer to the Army Nurse Corps, when ordered to active duty.

Twenty-five base hospitals were practically complete, as to personnel and equipment, prior to April, 1917, and this number was rapidly increased thereafter.

Upon the arrival of the British Commission in this country, in May, 1917, one of the first things they asked of the Government was medical assistance to help care for the British wounded, and it was a pleasant surprise when General Kean informed them that the Red Cross was in a position to send forward, without delay, a number of complete base hospitals, each unit made up of the best talent in the community from which it was organized. Colonel Goodwin, R. A. M. C., now Surgeon General, British Army, stated that, if possible, he would like to have six of these hospitals at once, and so the movement of this number was initiated and within three weeks the first of these were on their way overseas. Those selected were: No. 4, Cleveland, Lakeside Hospital, headed by Dr. George W. Crile; No. 5, Boston, Massachusetts, Harvard, headed by Dr. Harvey Cushing; No. 2, New York City, Presbyterian Hospital, headed by Dr. George Brewer; No. 21, St. Louis, headed by Dr. Fred T. Murphy; No. 10, Philadelphia, headed by Dr. R. H. Harte, and No. 12, Chicago, Illinois, headed by Dr. F. A. Besley. Upon arrival overseas, these hospitals were assigned to the British Expeditionary Force and located behind the British lines, where they have served with great credit to the Army Medical Department, the American Red Cross, and the medical profession of theUnited States.

The organization of base hospitals, under the Red Cross, was received with enthusiasm, and the fifty authorized by the Surgeon General were quickly accepted by the medical institutions of the country and their organization speedily undertaken so that they were ready and waiting for active service before the Army was ready to place them. However, one after another, as they were ordered out, they proceeded to join the various divisions of the American forces, and were sent overseas to take their places behind the American lines in readiness for the great work to come.

Although originally planned as 500-bed hospitals, they were all expanded to from 1,000 to 2,000 bed capacity as soon as they were ordered out, and many of the original directors and other personnel were detached to other and more important duties with the American Expeditionary Force, but not before the units were so well trained that this in no way interfered with the excellence of the service rendered.

Only when the indifference to military preparedness that existed in our country prior to 1917 is realized can the foresight and judgment of the Director General of Military Relief in originating these units be best appreciated. It was the one big contribution of the American Red Cross at the very beginning of the participation of the United States in the war.

The complete list of Red Cross Base Hospitals furnished the Army is as follows:

No.	*Location*	*Director*
1.	Bellevue Hospital, New York City.	Dr. George B. Wallace
2.	Presbyterian Hospital, New York City.	Dr. George Brewer
3.	Mt. Sinai Hospital, New York City.	Dr. Howard Lilienthal
4.	Lakeside Hospital, Cleveland, Ohio.	Dr. George W. Crile
5.	Harvard University, Boston, Mass.	Dr. Harvey Cushing
6.	Massachusetts Gen. Hospital, Boston, Mass.	Dr. F. A. Washburn
7.	Boston City Hospital, Boston, Mass.	Dr. J. J. Dowling
8.	New York Post Graduate Hospital, New York	Dr. Samuel Lloyd
9.	New York Hospital, New York City	Dr. C. L. Gibson
10.	Pennsylvania Hospital, Philadelphia, Pa.	Dr. R. H. Harte
11.	St. Joseph, St. Mary and Augustana Hospital, Chicago, Ill.	Dr. N. M. Percy
12.	Northwestern University Medical School, Chicago, Ill.	Dr. F. A. Besley
13.	Presbyterian Hospital, Chicago, Ill.	Dr. Dean D. Lewis
14.	St. Luke and Michael Reese Hospital, Chicago, Ill.	Dr. L. L. McArthur
15.	Roosevelt Hospital, New York City.	Dr. Charles Peck
16.	German Hospital, New York City.	Dr. Fred Kammerer
17.	Harper Hospital, Detroit, Mich.	Dr. Angus McLean
18.	Johns Hopkins Hospital, Baltimore, Md.	Dr. John M. T. Finney
19.	Rochester Gen. Hospital, Rochester, New York.	Dr. John M. Swan
20.	University of Pennsylvania Hospital, Philadelphia, Pa.	Dr. John B. Carnett
21.	Washington University Medical School, St. Louis, Mo.	Dr. Fred T. Murphy
22.	Milwaukee County Hospital, Milwaukee, Wis.	Dr. C. A. Evans
23.	Buffalo Gen. Hospital, Buffalo, N. Y.	Dr. Marshall Clinton
24.	Tulane University, New Orleans, La.	Dr. John B. Elliott
25.	Cincinnati Gen. Hospital, Cincinnati, Ohio.	Dr. William Gillespie

No.	*Location*	*Director*
26.	State University of Minnesota, Minneapolis, Minn.	Dr. Arthur A. Law
27.	University of Pittsburgh Medical School, Pittsburgh, Pa.	Dr. R. T. Miller
28.	Christian Church Hospital, Kansas City, Mo.	Dr. J. F. Binnie
29.	Medical School University of Denver, Col.	Dr. J. W. Amesse
30.	University of California, San Francisco, Calif.	Dr. E. S. Kilgore
31.	Youngstown Hospital, Youngstown, Ohio.	Dr. Colin R. Clark
32.	City Hospital, Indianapolis, Ind.	Dr. Edmund D. Clark
33.	Albany Hospital, Albany N. Y.	Dr. A. W. Elting
34.	Episcopal Hospital, Philadelphia, Pa.	Dr. A. P. A. Ashurst
35.	Good Samaritan Hospital, Los Angeles, Calif.	Dr. J. J. A. Van Kaathoven.
36.	College of Medicine, Detroit, Mich.	Dr. Burt R. Shurly
37.	King's County Hospital, Brooklyn, N. Y.	Dr. Edwin H. Fiske
38.	Jefferson Medical School, Philadelphia, Pa.	Dr. Wm. M. L. Coplin
40.	Good Samaritan Hospital, Lexington, Ky.	Dr. David Barrow
41.	University of Virginia, University, Va.	Dr. Wm. H. Goodwin
42.	University of Maryland Medical School, Baltimore, Md.	Dr. A. C. Harrison
43.	Emory University, Atlanta, Ga.	Dr. E. C. Davis
44.	Massachusetts Homeopathic Hospital, Boston, Mass.	Dr. Wm. F. Wesselhoeft
45.	Medical College of Virginia, Richmond, Va.	Dr. Stuart McGuire
46.	University of Oregon, Portland, Oregon.	Dr. Robert C. Yenney
47.	San Francisco Hospital, San Francisco, Calif.	Dr. Chas. Levison
48.	Metropolitan Hospital, New York City	Dr. Wm. F. Honan
49.	State University, Omaha, Neb.	Dr. A. C. Stokes
50.	University of Washington, Seattle, Wash.	Dr. J. B. Eagleson
102.	Loyola University, New Orleans, La.	Dr. Joseph A. Danna

The majority of these hospitals were sent to France. A few were stationed in England. Base Hospital No. 16 was organized as General Hospital No. 12 at Biltmore, N. C. Base Hospital No. 102 was organized for service in Italy and was composed chiefly of Italian-speaking doctors.

AMBULANCE COMPANIES

With the same idea of preparedness, the American Red Cross authorized the Director of Medical Service, Colonel R. U. Patterson, Medical Corps, U. S. Army, to organize, in the Red Cross, ambulance companies to correspond with the companies in the Medical Department, except that the Red Cross companies were motor companies, whereas up to 1916 the Army had made no provision for such motorized companies, all the regular army companies being provided with animal drawn vehicles. Through the energy of the Director, a number of such ambulance companies were organized in 1916, and this number increased to forty-six such companies in the early spring of 1917. As rapidly as these companies completed the organization of their personnel, they were transferred to the Army Medical Department, assigned by it to the various divisions of the Army as regular army companies and were dispatched overseas. Complete equipment of motors and other things pertaining to such companies was provided, in most instances, by the local Red Cross Chapter or by individuals interested in the unit.

The following is a list of all such companies, showing the place of organization and the commanding officer of each company:

No.	*Location*	*Captain*
1.	Pasadena, Calif.	Dr. Charles D. Lockwood
2.	University of California, Berkeley, Calif.	Dr. Alvin Powell
3.	University of Chicago, Ill.	Dr. Elbert Clark
4.	Cleveland, Ohio.	Dr. Harold O. Ruh
5.	Washington, D. C.	Dr. Ryan Devereux
6.	Fordham University, N. Y.	Dr. Joseph Donnelly
7.	University of New York, N. Y.	Dr. Chester F. S. Whitney
8.	Detroit, Mich.	Dr. Charles Barton
9.	Northwestern University, Chicago, Ill.	Dr. Stephen V. Balderston
10.	Columbia University, N. Y.	Dr. Wm. H. Rockwell
11.	Battle Creek, Mich.	Dr. James T. Case
12.	University of Washington, Seattle, Wash.	Dr. David C. Hall.
13.	Pittsfield, Mass.	Dr. Robert J. Carpenter
14.	University of Oregon, Eugene, Oregon	Dr. John E. Kuykendall
15.	Grand Rapids, Mich.	Dr. Thomas D. Gordon
16.	Fredonia, Kans.	Dr. Edgar C. Duncan
17.	Boston, Mass	(No Captain)
18.	Indianapolis, Ind.	Dr. Mason B. Light
19.	Portland, Ore.	Dr. Ernest H. Streit
20.	Atlanta, Ga.	Dr. Leo P. Daly
21.	Flint, Mich.	Dr. Walter H. Winchester
22.	Charleston, W. Va.	Dr. Timothy L. Barber
23.	Portland, Me.	Dr. Ernest B. Folsom
24.	Kansas City, Mo.	Dr. Ernest W. Cavanese
26.	Columbia, S. C.	Dr. Marion H. Wyman
27.	Salt Lake City, Utah	Dr. Hugh B. Sprague
28.	Detroit, Mich.	Dr. Griffith A. Thomas
29.	Atlanta, Ga.	Dr. Walpole C. Brewer
30.	Denver, Colo.	Dr. Thomas M. Hopkins
31.	Greensboro, N. C.	Dr. Charles S. Lawrence
32.	Greenville, S. C.	Dr. James E. Daniel
33.	Summit, N. J.	Dr. Wm. H. Lawrence, Jr.
34.	Hudson County, N. J.	Dr. Frederick J. Quigley
35.	Buffalo, New York	Dr. A. L. Lindquist
36.	Houston, Texas	Dr. Claude C. Cody
37.	Minneapolis, Minn.	Dr. Ralph T. Knight
38.	San Antonio, Texas.	Dr. Homer T. Wilson.
39.	Vicksburg, Miss.	Dr. Nolan Stewart
40.	Fort Worth, Texas	Dr. Will S. Horn
41.	Lock Haven, Pa.	Dr. George D. Green
42.	Michigan (Flint)	Dr. F. A. Roberts

No.	*Location*	*Captain*
43.	Raleigh, N. C.	Dr. Charles L. Scott
44.	Topeka, Kansas	Dr. Charles H. Lerrigo
45.	Memphis, Mich.	Dr. Walter R. T. Sharpe
46.	Richmond, Va.	Dr. C. Howard Lewis

SANITARY TRAINING DETACHMENTS

Sanitary Training Detachments of the American Red Cross are primarily for the purpose of teaching First Aid in a systematic way. But in addition to first aid, the Red Cross undertakes to give a course of training such as is given to sanitary troops, thus to build up a reserve of men, more or less trained, who would be available for enlistment in the Medical Department of the Army or Navy, when needed. To accomplish this the Red Cross Chapters organized a large number of these detachments, and many of the men so trained have found their way into the service.

These detachments have no military status and are solely for the purpose of education along the lines mentioned above. When the number of men needed for the Medical Department became so great the necessity for having such courses of training was at once obvious since there is no other place or organization which in any way affords an opportunity for such instruction, outside of the military service, and that service, on a peace basis, had nothing in the way of a reserve that amounted to anything. The enormous difficulty of trying to organize a Sanitary Service for the Army from a mass of absolutely untrained men can only be appreciated by those medical officers upon whom such duty has evolved during the recent emergency, therefore, such an effort on the part of the Red Cross was most welcome and has been more than justified by experience.

Soon after our forces began to assemble, it developed that the Red Cross, through its Department of Military Relief, had to take on greatly enlarged responsibilities in addition to its actual work of assistance to the Medical Department. To carry out this plan a Bureau of Camp Service was inaugurated, whose function it was to extend Red Cross Service to all the forces. The so-called Hospital Service became a feature of this service. Red Cross convalescent houses were built in connection with each hospital to provide a place of recreation and amusement for sick or wounded soldiers able to be up and around. There was also built in connection with each nurses' house a recreation house for the nurses so that these women, so lately out of civil life, might have a place for rest and recreation and be able to meet their friends and families thus helping to keep up their strength and morale during the period of then rather trying service.

In the convalescent house Red Cross personnel was provided to care for Red Cross work among the sick and wounded. Workers were ready to amuse and entertain the men, by reading to them; by writing letters to their friends and families; by getting up entertainments, either professional or amateur; by teaching the men games; by teaching them to make things.

For the entertainments, a stage was provided with scenery and all the necessary appurtenances thereto. A library was installed in each house by the American Library Association with books and magazines of all sorts and descriptions. Rooms were provided in the house where relatives of seriously sick men might spend the night if necessary to do so. The main object of this service was to assist the Medical Department in its care of the sick and wounded and to make them feel that their home people had a very active interest in their welfare.

The hospital service of the Red Cross which was directly under the control of the commanding officer of the hospital, was largely made up of women volunteers, who were there to add a touch of home comfort to the sick, to keep the families advised as to the condition of their men, to urge upon them the need for letting their families hear from them and to endeavor on all occasions to care for their domestic troubles, in this way removing from their minds all causes for anxiety and worry. If a man was found depressed and worried over his wife or family a telegram or a letter to the Red Cross Chapter at his home put in motion a movement to relieve the source of worry, as, perhaps a wife out of funds would be carried over the time until her allotment arrived, or a doctor would be secured to care for a sick child, or a lawyer to settle a legal difficulty, whereupon the soldier being relieved of his anxiety, would proceed to a more rapid recovery of his health and morale.

Judicious, systematic assistance, without excess of sentimentality, has meant a great assistance to the military authorities in their tremendous task of making an army out of the mob who were drafted into the army to fight the battles of their country in her efforts to make freedom and democracy a reality.

THE BUREAU OF MOTOR SERVICE

The entrance of the United States into the world war and the tremendous expansion of our Army and Navy called for corresponding increases in the activities of the American Red Cross, which involved large demands for transportation of material, equipment and personnel.

At first the need was taken care of either by paying for it or, irregularly, by Chapter members. Soon, however, some of the Chapters realized that this service could and should be made regular and reliable and a few motor corps were organized, but by February 1, 1918, the value of the service became so apparent that a Bureau of Motor Service was created at National Headquarters in Washington for the purpose of organizing, regulating and directing Red Cross Motor Service throughout the United States.

Guided by the recommendations of some of the women who had had experience in this work, rules and regulations, uniforms and insignia were adopted and chapters were encouraged by National Headquarters to form regularly organized Motor Corps under its direction.

The women responded magnificently. Motor corps were organized in many chapters throughout the country and coöperated with the various other Red Cross activities and with the military and naval authorities, which resulted in the saving of much valuable time and incalculable expense and in releasing men who would otherwise have been required for such service.

The whole service is composed entirely of women volunteers who donate not only their time and work, but in nearly all cases their cars and expense thereof, as well as buying their own uniforms. In addition, those who wish to qualify for the "First Division" of Motor Corps (ambulance and truck drivers) are obliged to pass examinations in motor mechanics, first aid, sanitary drill and driving and are given certificates only upon being passed.

In addition to the "First Division" there is the "Second Division" (transportation drivers) who, though in uniform, are only required to have a knowledge of simple mechanics, of good driving and of traffic rules. This division has auxiliaries, not in uniform, who give intermittent or lesser service or serve when called upon.

When the call came for 300 women motor drivers for overseas service, more than that number quickly volunteered their services and, those who were not able to pass the rigid standards required, undertook courses of training. At the time the armistice was signed about one hundred had proceeded to their duties overseas.

At the time of the signing of the armistice there were nearly 300 Motor Corps, with a membership of approximately 11,000.

Most of these women gave a minimum of 16 hours per week to the work and many of them gave many times that, especially in times of emergency. The minimum, however, represents an annual service of over 9,000,000 hours and the value of the cars put at the service of the Red Cross for that period is, conservatively, $15,000,000.

In some of the larger centers of population and at ports of embarkation and debarkation, garages for the cars and ambulances and dormitories for the women were arranged for and, in some cases, it was found to be necessary to erect buildings for those purposes. There are approximately 300 ambulances in this service in the United States.

It really requires a personal view of the work to realize fully its great value and the devotion, faithfulness and enthusiasm of the women.

The harder the work, the better they seem to like it—and if it has anything to do with sick or wounded soldiers or sailors or with civilians actually ill or in distress—they literally work until exhausted.

It is a revelation to watch the systematic and efficient work of these trained volunteer women with the Red Cross ambulances at a debarkation of our sick and wounded boys from the transports returning from France; or in taking them from the evacuation hospitals to the hospital trains, meeting them at their destination and driving them carefully to the hospitals where their recovery is to be completed.

During the country-wide influenza epidemic these women were there "to a man," working all hours of the day and night, carrying patients to the hospitals from homes of wealth and poverty alike, transporting doctors and nurses, even caring for patients, cooking meals, scrubbing floors and conducting funerals. It was often necessary to carry patients down flights of stairs in chairs, in blankets and even on their backs. Many women worked well over 100 hours per week during this trying period, not a few becoming ill as a result of their labor and exposure, and many a life was saved on account of their heroic efforts.

Again in the Perth Amboy disaster the Red Cross Motor Service was promptly "on the job," caring for the wounded, finding food, clothing and shelter for the homeless, carrying doctors, nurses, supplies and equipment wherever needed.

Also in the molasses tank explosion in Boston they were on hand promptly transporting people, equipment and supplies, frequently wading in deep molasses and mud with no thought of themselves.

The way the women have measured up to the work is particularly splendid because there is little of glamour and much of effort, exposure and hard physical work connected with the service. They have earned the gratitude of the Red Cross and of the public.

BUREAU OF CANTEEN SERVICE

At the outbreak of the war, Congress authorized large increases in our Army and Navy. When the United States entered the war and the draft became effective, tremendous cantonments were built in various sections of the country, hundreds of thousands of men were called to the colors and mobilized at concentration camps, oftentimes in the most inaccessible places.

The great railroad systems of this country, already overtaxed and thoroughly unprepared to meet such demands for transportation became so entangled that thousands of men, full of patriotism and fighting spirit, were loaded into cars and trains, attempting to reach concentration camps. There were serious delays, breakdowns and accidents along the lines of travel; equipment was of ancient vintage, in many cases, food, medical supplies and other necessities were difficult, if not impossible to procure en route. The morale of these men, both volunteers and drafted soldiers, became seriously affected. The Government and the railroad administration were confronted by a serious problem; gigantic and unprecedental. The Army had expanded so rapidly that it was impossible for the Commissary Department, the Medical Corps, the Signal Corps or the railroads to cope with the situation. Men were taken dangerously ill en route and required medical attention. Every kind of catastrophe, large and small, happened to break the spirit of these men who were to win the victory on the battlefields of Europe.

With this problem to face, the American Red Cross went into consultation with government officials and offered its services, which were promptly accepted. Today an army fights on its morale as well as its stomach, and it was the problem of the American Red Cross to aid in stimulating the morale of the men en route and also to aid in meeting every emergency that could and would arise. Early in June, 1917, the Bureau of Canteen Service was created in the Department of Military Relief; a National Director of Canteen Service was appointed; an immediate survey of the country was made and a Division Director of Canteen Service appointed in each of the fourteen divisions. Each division director promptly covered every railroad in his division, located the strategic railroad points, decided where canteen service should be inaugurated and then issued instructions to the chapters to proceed with the organization.

A national call was sent out to the women of America explaining this service, unquestionably a mother's job. Within a comparatively short period more than 50,000 women had responded to the call of the canteen directors and 700 well-organized units of specially selected women were in operation. There was a canteen at every important railroad junction and terminal in the United States and several were established in Canada. Canteen huts, transfer hospitals, first-aid rooms, stock-rooms, recreation rooms, shower baths, etc., were immediately erected at over 300 points along the lines of travel. Close and intimate contact was established with the railroad and army officials so that the canteens were advised by telegraph in advance of movements of drafted men to camps and of movements of troops from camp to camp and from camps to the embarkation points.

The effect of the Canteen Service worked like magic on the men. The canteen committees in their "home towns" gave the men a big "send off," their mothers, wives and sweethearts were there to bid them Godspeed. Sweaters, comfort-kits, magazines, food, fruit and flowers were given to the men. Bands of music were provided and banquets were served.

As the men traveled from their homes to concentration camps, the canteens along the line met them, no matter how late at night, what day of the week or what the weather conditions were, the canteens were always on duty. All during the winter, the little canteen huts remained open day or night. Neither rain, snow nor storms kept these patriotic canteen women from their duty. If the train was delayed, food exhausted, water and steam cut off, lights out, sickness on board, the American Red Cross canteen workers were always available to remedy troubles and to give the men a smile of good cheer, a cup of coffee and a sugar bun and send them happily on their journey. In the heat of the summer large batteries of shower baths were installed and operated at fixed points along the lines of travel. The Canteen Service did wonders in helping the drafted men en route to the camps. Thousands of testimonial letters are on file from officers and men praising the work and expressing gratitude for the service rendered.

As soon as the drafted men arrived at the camps, thousands of them were selected and transferred from one camp to another; oftentimes travelling without officers or in charge of new and inexperienced officers who had never travelled to any extent before. Many of the men were just beginning their career as soldiers, they did not know where they were going, frequently were sick and depressed in spirit, sometimes surly and unruly. These trains would not get very far on their route before the Red Cross canteens would begin meeting them. Neat uniformed motherly women were in every railroad yard, smiling and greeting each man with a little cheer. Fresh supplies, not of the army ration variety, but the kind "Mother used to make at home" were generously given. Stamps, postal cards, reading matter, etc., were distributed liberally without cost.

Arrangements were made with the army officials, so that if troop train commissary officers found their supplies exhausted and desired to procure new supplies, they could telegraph ahead to a canteen and articles and foodstuffs would be purchased for them at cost at all hours of the day and night (including Sundays and holidays). Complete meals and lodging could, if desired, be arranged for. Instructions issued by the Surgeon General's Office that in event of troop train commanders needing the services of a surgeon, a dentist or a physician en route they should call on the Red Cross canteen and the service would be promptly supplied. Relatives were put in touch with their boys, home troubles were taken care of and every conceivable service was rendered by the canteens for the relief and comfort of the men in transit.

By coöperation with the canteens, the Surgeon General's Office arranged with the American Red Cross canteens to take sick men from trains, to give receipts to the commanding officer, to transfer the men to military or private hospitals along the lines, to care for their service papers, to arrange for medical attention, operations, dentistry, etc., to notify the parents and advise the proper commanding officers. The Adjutant General's office arranged with the canteens to have the men sent back to their ports after they recovered their health and were able to rejoin their commanders. In instances where men died, the entire funeral arrangements were made by the canteens; bodies were shipped to the relatives, accompanied by escorts, the caskets wrapped in the American flag. Every attention possible was given to each man in the service irrespective of his creed or color. Thousands of little human interest stories occurred everywhere, many of which are very touching:

> At a little canteen in the desert of Arizona, a smallpox patient was taken from the train, a tent erected, and there he was kept with the pullman porter in isolation and their meals brought to them, and he was cared for until here covered and was able to return to his regiment.
>
> At a small town in Virginia a negro en route overseas became suddenly ill with pneumonia, was removed from the train and turned over to the canteen workers. He was placed in a private hospital and attended by the best physicians. He died a few days. His old parents in North Carolina were notified; funeral services were held in the colored church attended by the members of the canteen, and a white guard of honor escorted the casket, wrapped in the American flag to the train. All expense was met by the American Red Cross. In his "home town" the train was met by the canteen and the funeral attended by its members.
>
> A little bride in an Ohio town had come to a big city expecting to be married when she reached there. Her funds were exhausted and she came into the canteen in great distress. Through the efforts of the canteen women contact was established with her fiance, and when his train came through the city the wedding was held in the station with the members of the canteen and his fellow-soldiers attending.
>
> Reunion of men with their mothers, sisters and sweethearts were effected all along the line. Home parcels were delivered; watches, jewelry and money were transmitted from homes to the men en route and from the men to their dear ones.
>
> Enormous quantities of coffee, cigarettes, post cards and food of all kinds were liberally distributed without expense to the men.

A few statistics of the operation of the Canteen Bureau are interesting. Up to December 30, 1918, the records of the Canteen Bureau ow thatsh more than 50,000,000 canteen services were rendered men in transit. More than 103,000 men taken sick en route were aided and over 9,000 sick men were removed from trains and transferred to hospitals along the lines of travel. Some of the supplies distributed free are the following:

1,206,480 gallons of coffee
8,369,664 sandwiches
5,523,396 pieces of reading matter
5,075,172 boxes of matches
95,408,640 cigarettes
475,992 pounds of tobacco
996,816 pounds of candy
6,184,372 bars of chocolate
32,143,704 postal cards
97,368 bushels of fruit
538,416 meals and lunches

During the summer months many carloads of watermelons were distributed. More than 1,000,000 shower baths were furnished free.

American Red Cross canteens were established at each port of embarkation in the United States and Canada. Store-rooms, emergency hospitals, coffee plants and kitchens were promptly built and completely equipped. Specially trained corps of women were organized for the work at the embarkation piers. The Canteens were notified as each ship arrived in port. Canteen Service in abundance was provided at every embarkation point. Many touching instances occurred at these "stepping-off points into the Great Unknown." Not a soldier, sailor or marine sailed from this country without receiving Red Cross Canteen Service and each man was bid *bon voyage* by the heroic, smiling American women of the embarkation canteens as the big ships sailed away. A "Safe Arrival" post card was signed by each man and mailed to his home by the canteens on receipt of cable advice announcing his ship's safe arrival "over there."

One morning at Hoboken 8½ tons of "honest-to-God" coffee, as the men call the Red Cross canteen coffee, was passed out to the embarking troops on a great fleet of transports. Oftentimes in the dead of winter the canteens equipped with rolling kitchens, supply wagons, automobile trucks and other suitable paraphernalia, worked all night on the big piers and waited until the ships started down the bay. As the great ocean liners pulled out with their precious freight, the women lined up and waved good-bye, as the men on board cheered heartily. It was an inspiring sight. One morning, just before the *Leviathan* sailed with many thousands of America's finest fighting men, the captain came down in person to shake the hand of each member of the canteen, and to tell them that it was an inspiration to him and to the men on board to know that they were going to fight for such women. The canteens represented the gratitude and appreciation of the American people for the great sacrifice being made by the men of the country.

The signing of the armistice and the announcement of returning transports with both wounded and well men, found the Red Cross canteens prepared, organized, and equipped to render valuable service. Piers were promptly decorated, reception committees organized, bands of music engaged and each transport as it pushed its great bow into the landing slip found the American Red Cross canteen women lined up at the piers waving a rousing welcome amid the lively strains of music. As the men marched down the gang-planks the Red Cross canteen women, who sent them off, were there to greet them and to express the hospitality and appreciation of the American people. Enormous quantities of food, coffee, cigarettes, chocolate, and flowers were distributed; telegrams sent, postal cards mailed and all kinds of services rendered. Not a man has returned without receiving canteen service. Canteens along the line of travel of the returned men were decorated and made ready to cheer the men on their homeward journey into the big debarkation camps.

The problem of receiving the returned wounded was promptly met. Through permission of the port surgeons, canteens were established on each of the harbor transfer boats and at every pier at which the wounded men were to be received. Frequently the women boarded the transports in the lower harbor and distributed cigarettes, magazines and flowers; sent thousands of telegrams, and mailed innumerable post cards and letters. As these men, oftentimes without legs or arms-stretched out on litters, many of them permanently disabled and in a serious condition, arrived at the debarkation piers, every possible thing was done for their comfort and happiness. Nothing was too good for these men who had sacrificed so much. The canteen women were untiring in their service, often working as long as 36 hours without relief. No man was allowed to feel that his sacrifice had not been appreciated. The wounded were transferred by the U. S. A. Medical Department to debarkation hospitals where they were kept for a few days prior to their being sent to the base hospitals at inland points.

The Canteen Bureau immediately put on traffic experts at each of the important ports and began coöperating with the railroad administration, and the medical officers so that advance information was obtained of all movements of hospital trains or cars of sick and wounded men attached to regular trains. This information was immediately relayed to canteens along the lines of travel. Special hospital train time-tables and maps were prepared by the Canteen Bureau and supplied to each medical officer in charge of the men.

Several hundred specially selected women were appointed as canteen escorts, two of these women being placed on each hospital train leaving the debarkation hospitals to ride on the trains with the men during the daylight hours, to render every aid possible, and to see that the canteens along the line functioned effectively with the wishes of the commanding officers of the train. The canteens throughout the country organized canteen escort service, and each morning, relays of escorts boarded the hospital trains at various points on the journey across the continent from debarkation hospitals to inland hospitals. The services rendered the men along the lines of travel are best told by some of the many human interest stories on file at National Headquarters, American Red Cross.

At the time of the signing of the armistice there were approximately a million and a half men in camps to be demobilized. The problems of demobilizing the overseas men had to be faced. The General Staff of the Army decided to demobilize a fixed number of men from each camp in the country each day, and to give each men a mileage allowance together with his pay, and to dismiss him at the camp, letting him return home as a discharged man (or a civilian) still wearing his uniform. It is the privilege of the American Red Cross to perform the final acts of kindness, and to express the appreciation of the American people to these men returning to civilian life.

Canteens are kept open 24 hours. Every train, irrespective of its destination, was met at each of the canteen stations. At all important junctions, transfer hospitals, check rooms, recreation rooms, kitchens and lodging quarters were opened to take care of the individual soldier who might find himself stranded in the big city. All manner of service was rendered. Many men missed their trains; took the wrong trains; lost their money; were taken ill, and numerous other things happened to them. The canteens promptly met this situation and rendered invaluable service.

(*To be concluded*)

* * *

EDITORIAL

LEST WE FORGET

Our profession is not one that usually brings material reward as the recompense for years of toil. This is particularly true of those of the medical profession who live out their lives in the shadow of the colors. For all of us doctors, wherever we may have cast our lot, esteem, respect of our fellow-men and a certain amount of distinction dependent on individual ability must serve for the most part in place of the more substantial recognition which is attendant on the effort of those in more material walks of life. This has always been the unwritten law of our calling and it is not probable that it will change as years go on.

The perpetuation of an honorable name built up by years of painstaking toil, of careful work and honest endeavor cannot, however, fail to be a cause of pride to our descendants and when all is said and done is more enduring than a monument based on wealth alone.

In the naming of hospitals in accordance with the wording of the general order printed herewith this is carried out. It had already come into being with the designation of the Walter Reed General Hospital and the Letterman General Hospital and the extension of the purpose insures a more general familiarity with the names of those who have given largely of themselves for the advancement of the profession and the betterment of the service.

It is pleasant to notice in the list of the names recommended by the Surgeon General of the Army assigned in the order that among them is that of First Lieut. William Thomas Fitzsimons. It is somehow good to know that among the surgeon generals and men of more mature years and longer service, this young man of modest rank, a beginner in the duties of his corps, has been chosen as an example worthy of note and remembrance. It rather strengthens one's confidence in the justice of things and the belief that it is not *rank* which counts, but *worth*. It is fitting acknowledgment too, of the great part which was played, and which must always be played in the wars of our country, by those who are not soldiers by profession but who come loyally to the need of the nation at her call.

We make bold to say that it is an earnest that the brotherhood of man exists between us of the regular service and you, who so readily laid aside your own affairs to take up those of national necessity.

And so, as you who came to swell our ranks in the time of need, point with pride to the achievements of this young man as indicative of good work done by many like him, we too, who are lifelong soldiers, are proud of him. Not proud of him because he was appointed for the emergency, nor because he came from some certain section of the country, nor for any other reason than that he was a man, and played to the last end his part to the credit of himself and the profession which he represented.

We append the order referred to, a short synopsis of his life and a brief description of the hospital which is to carry his name.

JAMES ROBB CHURCH.

WAR DEPARTMENT

WASHINGTON, *June* 26, 1920.

General Orders No. 40.

Classification, designation and names of military hospitals.—Pending the general revision of Army Regulations and Manual for the Medical Department, now under way, the following changes are announced in advance for the information and guidance of all concerned.

1. Hospitalization provided by and for the Army, in peace or war, is divided into main categories, viz:

   (*a*) The stationary or fixed establishments.

   (*b*) The field or mobile units.

2. In time of peace, at home or abroad, and in the "Zone of the Interior" in time of war, only two types of fixed establishments are maintained, viz:

   (*a*) Station hospitals (formerly called post hospitals, camp hospitals, etc.).

   (*b*) General Hospitals (including those formerly called department hospitals, and base hospitals).

3. None of the fixed establishments mentioned in the preceding paragraph will be given a numerical designation. They will be identified by giving the type title of the hospital and its location, for example:

"Station Hospital, Camp Taylor, Kentucky."
"Station Hospital, Fort Greble, Rhode Island."
"Station Hospital, Coblenz, Germany."
"Station Hospital, Petit Barracks, Mindanao, P. I."

4. In addition to the type title and location, each general hospital mentioned in paragraph 2, will bear the name of a deceased distinguished medical officer of the United States Army; for example:

"Letterman General Hospital, San Francisco, Calif."

5. The names of general hospitals will be announced in orders by the War Department as required from time to time. (See paragraph 14.)

6. Hospitals established at garrisoned posts, forts, stations, cantonments, camps, etc., will be designated as station hospitals and each will normally receive patients only from the garrison to which it belongs. In exceptional instances they may be so located and established as to meet the needs of a certain district or section, or may be designated to receive special cases from any place within the department or section under whose control they function.

7. Hospitals designed to serve general and special rather than local needs will be designated as general hospitals. They will be located at such points as may be determined by the War Department, acting upon the recommendation of the Surgeon General.

8. For the hospitals mentioned in paragraph 2 no standard capacity is prescribed.

Their capacity will be based solely on the principles of adequacy, and will vary according to the local and general requirements.

9. In time of actual or threatened hostilities, or whenever in time of peace, troops are engaged on any field work where the fixed hospitalization mentioned in paragraph 2 is not available or is insufficient to meet the needs, the following additional standard types are established.

MOBILE UNITS

Division, Corps or Army Units

(*a*) Hospital Companies (formerly called Field Hospital Companies)
(*b*) Surgical Hospitals (formerly called Mobile Hospitals)
(*c*) Evacuation Hospitals
(*d*) Convalescent Hospitals (formerly called Convalescent Depots)

FIXED ESTABLISHMENTS

Units of the Communications zone with an army in the field

(*e*) Station Hospitals (formerly called Camp Hospitals and for an army in the field to have a standard capacity of 300 beds)
(*f*) General Hospitals (formerly called Base Hospitals and for an army in the field to have a standard capacity of 1000 beds)

10. These sanitary formations, which accompany an army in the field, are designated by number consecutively from one upward for each type by the War Department. Location will not be given; for example:

Evacuation Hospital No. 6
Station Hospital No. 4
General Hospital No. 10

11. The system of nomenclature herein prescribed readily identifies a unit with an army in the field from one serving in the zone of the interior; the former always bearing a number and not giving its location, the latter always giving location but not bearing a number.

12. Station hospitals in peace or war, will function under such local, district, section, or departmental control as may be prescribed by the tactical or department commanders under whom they are serving.

13. General hospitals within the continental limits of the United States will function under the control of the Surgeon General. Those in the insular possessions and those belonging to an expeditionary force will function under the control of the department or tactical commanders under whom they are serving.

14. In consonance with the above and effective July 1st, 1920—

(*a*) All fixed hospitals maintained by the Army at home or abroad and not specially designated below as general hospitals are announced and will be known as Station Hospitals. They will include all those formerly called Post Hospitals, Camp Hospitals, and the Base Hospitals at San Antonio and El Paso, Tex.

(*b*) The Department Hospital, Manila, P. I., is announced and will be known as the "Sternberg General Hospital, Manila, P. I.," in honor of Brigadier General George Miller Sternberg, United States Army (born 1836, died 1915), eminent bacteriologist and sanitarian, who served as Surgeon General of the Army from 1893 to 1902, and founded the Army Medical School. (Awarded brevet ranks of captain and major in 1865 for faithful and meritorious service during the Civil War.)

(*c*) The Department Hospital, Honolulu, Hawaii, is announced and will be known as the "Tripler General Hospital, Honolulu, Hawaii," in honor of Major Charles

Stewart Tripler, Surgeon, United States Army (born 1806, died 1866), who served as a Medical Director of the Army of the Potomac during the Civil War, and as a distinguished author published in 1858 his celebrated manual on the examination of recruits. (Awarded brevet rank of brigadier general in 1865 for faithful and meritorious service during the Civil War.)

(*d*) The new hospital to be constructed on the military reservation at El Paso, Texas, for which funds have already been appropriated, is announced and will be known as the "William Beaumont General Hospital, El Paso, Texas," in honor of Major William Beaumont, Surgeon, United States Army (born 1785, died 1853), who during his service as a medical officer of the Army conducted epoch-making investigations of the physiology of digestion, and as a result of his researches became the leading physiologist of the country and the first to make an important and enduring contribution to that science.

(*e*) General Hospital No. 21, at Denver, Colorado, is announced and will be known as the "Fitzsimons General Hospital, Denver, Colorado," in honor of First Lieutenant William Thomas Fitzsimons, Medical Officers Reserve Corps, United States Army (born 1889, died 1917); a skilled surgeon and the first officer of the United States Army killed in the World War. He met his death at Dannes-Camiers, France, September 4, 1917, in an air raid by the enemy while serving with Base Hospital No. 5, United States Army. The name also fittingly commemorates the eminent services rendered by the civil medical profession of America as members of the Medical Corps of the Army during the World War.

(*f*) General Hospital No. 19, at Oteen, North Carolina, is announced and will be known as the "O'Reilly General Hospital, Oteen, North Carolina," in honor of Major General Robert Maitland O'Reilly, United States Army (born 1845, died 1912), who served as Surgeon General of the Army from 1902 to 1909, and under whose administration the Medical Reserve Corps of the Army was established.

(*g*) General Hospital No. 6, Fort McPherson, Georgia, is announced and will be known as the "Lawson General Hospital, Atlanta, Georgia," in honor of Surgeon General Thomas Lawson, United States Army (born 1795, died 1861) who served as Surgeon General of the Army from 1836 to 1861. (Awarded brevet rank of brigadier general in 1848 for meritorious conduct in the Mexican War.)

(*h*) General Hospital No. 28, Fort Sheridan, Illinois, is announced and will be known as the "Lovell General Hospital, Fort Sheridan, Ill.," in honor of Surgeon General Joseph Lovell, United States Army (born 1788, died 1836), who served as Surgeon General of the Army from 1818 to 1836. The first formal organization of a Medical Department for the Army was prescribed by Congress in 1818 and by virtue of that act he was appointed Surgeon General from Hospital Surgeon, being the first officer to bear that title.

(*i*) General Hospital No. 41, Staten Island, New York, is announced and will be known as the "Hoff General Hospital, Staten Island, New York," in honor of Colonel John Van Rensalaer Hoff, Medical Corps, United States Army (born 1848, died 1920), who throughout his entire military career devoted unremitting effort to the efficient organization and administration of the Medical Department and was the pioneer in the organization and development of the enlisted branch thereof, formerly known as the Hospital Corps.

(*j*) The Walter Reed General Hospital, Washington, D. C., will retain its present name.

(*k*) The Army and Navy General Hospital, Hot Springs, Ark., will retain its present name.

(*l*) The Letterman General Hospital, Presidio of San Francisco, Calif., will retain its present name.

15. To perpetuate this system of naming general hospitals the Surgeon General will maintain in his office and hold available for publication in general orders whenever required a list of names, with appropriate citations, sufficient for the nomination of any number of general hospitals that may be established in the zone of the interior during sudden expansion incident to war.

16. All current regulations in conflict with the foregoing are rescinded. (322.3, A.G.O.)

By order of the Secretary of War:

M. W. WRIGHT,
Major General, Acting Chief of Staff.

Official:
P. C. HARRIS,
The Adjutant General.

BRIEF HISTORY OF FIRST LIEUTENANT WILLIAM THOMAS FITZSIMONS, MEDICAL OFFICERS' RESERVE CORPS, DECEASED

His residence was given as 810 Rialto Building, Kansas City, Mo.

Born April 18, 1889 in Burlington, Kansas.

He was not married.

His nearest relative is given as his mother—Mrs. Jessie Fitzsimons, 517 Knickerbocker Place, Kansas City, Mo.

He held the following degrees: A. B. University of Kansas, 1910; M. D. University of Kansas, 1912.

As an interne he had 6 months in the German Hospital at Kansas City, Mo.; 12 months in St. Mary's Hospital, Kansas City, Mo., and 15 months, specializing in surgery, in the Roosevelt Hospital in New York City.

From September 6. 1914 to December 1, 1915, prior to his commission in the U. S. Army, he served abroad as a Red Cross surgeon at the front and in the various clinics of the Allied Armies.

Soon after his return from this service abroad he was commissioned first lieutenant in the Medical Reserve Corps of the U. S. Army.

Immediately upon the declaration of war by the United States (April 6, 1917) he applied for service abroad and was among the first group of Army Medical officers sent to the Western Front in Europe.

The citation in subparagraph (*e*) recites how he met his death.

About a week after his death Mr. Borland in the House of Representatives on September 10, 1917, introduced a bill (H. R. 6005) to provide for the posthumous promotion of the deceased to a captain.

BRIEF DESCRIPTION OF FITZSIMONS GENERAL HOSPITAL, U. S. ARMY, DENVER, COLORADO

1. This institution consists of a tract of 500 acres of land and about 75 buildings. The property is situated along the Union Pacific Railroad about 8 miles east of the civic center of Denver, with which it is connected by 2 highways; one a nationally known route extending from the city southward to Kansas, the other a local city boulevard extended.

2. The land is held by the Government on a 99 year lease at a nominal rental of $1.00 per year. It was originally acquired by the Denver Civic and Commercial Association during the World War and offered to the Surgeon General of the Army for hospital purposes. This patriotic organization purchased the land from the

respective owners and thus made it available as a single tract for the use of the Government. A considerable portion of the land upon which this hospital rests was known formerly as Gutheil Park.

3. The buildings are arranged in a group situated in the center of the reservation and were constructed of tile and stucco at a cost of over $3,000,000. Originally the institution was intended and planned as a 1,000 bed hospital but it was soon discovered that this would not be sufficient for the needs of the Army in that locality during the war. Accordingly the plans were altered and construction prosecuted on the basis of a 2,500 bed capacity. This capacity, however, was not fully reached, except possibly so far as available shelter alone is concerned.

4. Since the armistice and subsequent period when the greatest number of sick were under treatment, the patient capacity of the hospital has been considerably reduced, and some of the ward buildings have been altered and are still being altered for utilization other than as actual housing of the sick. At present several buildings are being remodelled for the accommodation of officers and noncommissioned officers on duty at the hospital. Also extensive road improvement has recently been contracted for.

5. In addition to the hospital proper, a considerable portion of the reservation is being devoted to agricultural production and as time goes on this will be increased more and more, the benefits accruing to the local hospital messes.

6. The reservation now contains a tree nursery. Hundreds of young trees have been planted about the buildings and along the drives, and are in a flourishing condition. Extensive lawns are also being developed.

7. In caring for the tuberculous which were found among the draft forces or developed in the Army, several hospitals were established prior to the Fitzsimons General Hospital. This hospital then known as General Hospital No. 21 (the 21st on the list) was opened in October, 1918, and has been in constant operation since that time. The number of sick treated in this hospital rapidly rose. The high point was reached in June, 1919, at which time 1,400 were being cared for, and for a year thereafter the daily average of patients varied from 1,000 to 1,200. Now there are approximately 700 patients in the Fitzsimons General Hospital. The present buildings provide a normal capacity for 800 patients, but in emergencies it could be increased to 1,200 without undue crowding.

Obituary

GENERAL WILLIAM CRAWFORD GORGAS

General William Crawford Gorgas, Surgeon General, U. S. Army, during the four years of the European War, 1914–18, and well known for his work as Chief Sanitary Officer of the Panama Canal, died on July 4, in London, England, in the sixty-fifth year of his age.

General Gorgas was born at Mobile, Ala., on October 3, 1854. He was the son of Gen. Josiah Gorgas, of the Confederate Army, and received his earlier education in the South, graduating from the University of the South in 1875. He then went to New York to study medicine, and received his medical degree from Bellevue Hospital Medical College in 1879. He was interne at Bellevue Hospital during

1878–80, and, in the last year of his residence in hospital, took an examination for admission to the Medical Corps of the U. S. Army, receiving his commission as surgeon on June 16, 1880. He was promoted captain in 1885 and during the Spanish-American War served as a major and brigade surgeon of volunteers, being promoted major in the Regular Army on July 6, 1898. At the close of the Spanish-American War, he was appointed Chief Sanitary Officer of Havana, holding this position from 1898 until 1902. In connection with this important detail, it fell to his lot to apply to the sanitation of Havana the discovery of the late Major Walter Reed, that yellow fever is transmitted by mosquitoes, which was accomplished by Reed, as the head of an Army board sent to Cuba to investigate yellow fever in 1900-1901. In February 1901, shortly after Reed's discovery was established, Gorgas began to screen yellow-fever patients and to destroy fever-bearing mosquitoes by oiling the surface of all pools or collections of water where they were likely to breed. In three months Havana was freed from yellow fever for the first time in nearly two centuries. For this work in eliminating the disease from Havana, Gorgas was made a colonel and assistant surgeon general by special act of Congress on March 9, 1903. On March 1, 1904, he was appointed Chief Sanitary Officer of the Panama Canal, where he carried out the same line of work in the cleaning up of the Isthmus. When the French, under de Lesseps, began to work on the Panama Canal in 1880, the Isthmus was one of the plague-spots of the world and during their nine years of occupation, they lost 22,189 laborers from disease. When the United States took charge of the Canal in 1904, the death rate was high and yellow fever epidemic was going on. In less than a year, yellow fever was wiped out and there has not been a single case since May, 1906. Gorgas was made a member of the Isthmian Canal Commission in 1907, and remained in charge of sanitation until the winter of 1913, when he went to South Africa, at the invitation of the Chamber of Mines of Johannesburg, to investigate the high death rate from pneumonia among the natives working in the mines of the Rand. By applying the army methods of increasing the air space of sleeping quarters the death rate was materially lowered. He was appointed Surgeon General of the U. S. Army on January 16, 1914. He was given the rank of Major General in 1915. In 1916, he spent several months in South America in making a preliminary survey of localities still infested with yellow fever for the Rockefeller Foundation. Upon his retirement from active duty in the Army in the fall of 1918, he resumed this work and was engaged upon it at the time of his death. He conducted the administration of the Surgeon General's Office in Washington during the war period, and shortly before his retirement, accompanied the Secretary of War to France. General Gorgas was a member of many medical societies and received many honors during his life. He was awarded gold medals by the Liverpool School of Tropical Medicine in 1907 and by the American Museum of Safety in 1914. In March, 1914, he received the degree of Doctor of Science from the University of Oxford. General Gorgas was a man of attractive character, and highly popular with the medical profession. In 1885, he married Miss Marie C. Doughty, of Cincinnati, Ohio, who, with a daughter, Mrs. William D. Wrightson, survives him. (*Science*, July 16, 1920, p. 53.)

M. W. Ireland,
Surgeon General, U. S. Army.

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COMMENT AND CRITICISM

HEALTH NEWS

TREASURY DEPARTMENT, BUREAU OF THE PUBLIC HEALTH SERVICE

WASHINGTON, *June* 22, 1920.

THE MANAGING EDITOR.

DEAR SIR: Entirely in accordance with forecasts made by the Public Health Service over a year ago, bubonic plague has made its appearance in the United States. At the moment, foci of the infection are known to exist at New Orleans, Pensacola and Galveston, and in Tampico and Vera Cruz, Mexico. In Vera Cruz, the disease appears to have assumed the proportion of an epidemic.

With the definite knowledge we now possess regarding the transmission of this disease, and especially as to the rôle played by rats, the situation should cause no alarm or panic among the people of this country. Nevertheless the very real menace of bubonic plague calls for an energetic campaign of extermination directed against the rat, and other rodent pests.

I am inclosing a brief summary of some important facts about rats, and would like to suggest that you interest the people of your community, especially the business men, in organizing an effective rat-extermination and rat-proofing campaign. Through your State Board of Health, the Public Health Service is ready to coöperate with your local health authorities, and to give expert advice as how best to carry on such work.

Your coöperating in this matter will be a distinct contribution to the promotion of public health.

Respectfully,

H. S. CUMMING,
Surgeon General.

KILL THE RAT, THE SPREADER OF PLAGUE

Calling attention to the discovery of bubonic plague in several American and Mexican gulf ports, and renewing his warning regarding the introduction of plague from Mediterranean ports which are known to be infected, Surgeon General Hugh S. Cumming today urged communities throughout the country, and especially along the coast, to inaugurate rat-extermination and rat-proofing campaigns.

"Bubonic plague is primarily a disease of rodents, especially rats," said General Cumming, "and the disease can be controlled effectively by measures directed against the rat. The extermination of rats is all the more to be desired because of the tremendous economic damage they cause."

According to conservative estimates made by the U. S. Public Health Service on the basis of numerous surveys, there is at least one rat for every person in the United

States. This estimate coincides with that for Great Britain and Ireland, and with authoritative figures for Denmark, France and Germany. The annual upkeep per rodent was computed by the same authorities as $1.80 in Great Britain, $1.20 in Denmark, and $1.00 in France. The depredations of the rats in the United States will very probably exceed the estimate for Great Britain. One-half a cent a day is considered conservative, but even on this computation, it costs the United States $180,000,000 a year to support its rat population. This does not include mice.

"The U. S. Public Health Service is prepared to detail trained experts to assist communities in organizing the fight against rats," said General Cumming. "Many of our officers have had extensive practical experience in this work, and know how to make it really effective. In the seaport cities the work of extermination should be supplemented by bacteriological laboratory examinations to determine whether or not plague infection is present among the rodents. In the inland cities this is not now necessary."

The U. S. Public Health Service has just published a new bulletin entitled "The Rat: Arguments for its Elimination and Methods for its Destruction." Copies may be obtained by addressing the U. S. Public Health Service, Washington, D. C.

We publish this from the *British Medical Journal* of June 19, 1920, as a sample of the importance being attached to museum work as an educational factor in medicine. It is an evidence of the appreciation of the graphic element in teaching in addition to purely didactic work. Our own Army Medical Museum is following in this line.—THE EDITOR.

MILITARY MEDICINE AT THE IMPERIAL WAR MUSEUM

On June 9 the Imperial War Museum at the Crystal Palace was opened by the king. The collection comprises upwards of 100,000 exhibits illustrating the military, naval, aerial, and civil labors of men and women throughout the empire during the war. It is conceived not as a monument of military glory, but as a record of toil and sacrifice, a place of study for the technician and the historian; this intention was strongly emphasized by the king in his sympathetic reply. The greater part of the exhibition, of course, illustrates the combatant services, but a considerable portion is devoted to the Army Medical Section, in which are displayed nearly a thousand pictures illustrating various branches of medical activity in all zones of the war; a large number of these have been given by the Joint Committee of the Red Cross Society and the Order of St. John of Jerusalem. Among the artists whose work is represented are George Pirie, Hadyn R. Mackey, Edward Martin, Austin D. Spare, Sir John Lavery, and Guy Lipscombe. Special mention should be made of J. Hodgson Lobley's "Loading Wounded at Boulogne," and Mackey's "In the Wake of the Advance." There is also a noteworthy series of water colors and crayon drawings by David A. Baxter, whose "Dawn; Passchendaele" is grimly interesting, and vivid crayon drawings by Muirhead Bone and Claude Shepperson. The Joint Committee has presented several small statuary groups by Benjamin Clemens. The conditions under which the work of the R. A. M. C. was carried out in France are well illustrated in a number of models of regimental aid posts, advanced dressing stations, divisional baths, incinerators, and "disinfestors." A series of photographs and models show the methods and results of plastic facial surgery. There are also to be seen samples of the provisional limbs provided by the Joint Committee, and exhibits by manufacturers of artificial legs which combine strength with extreme lightness. There is a very large collection of appliances, bandages, instruments, and dental equipment captured from the Germans, Austrians and Turks: pewter syringes, lead catheters, and a cotton-wool substitute composed of fine wood shavings may be presumed to illustrate the enemy's shortage of war materials. Transport in all theaters of war is well illustrated by models and photographs, and there are examples of the camel cacolet, the sand sledge, and the wires and shoes used in Egypt. The Women's Section includes memorials of work in France and Serbia, together with a large display of hospital exhibits of all kinds.

BOOK REVIEWS

THE NOSE, PARANASAL SINUSES, NASOLACRIMAL PASSAGEWAYS, AND OLFACTORY ORGAN IN MAN. A genetic, developmental, and anatomico-physiological consideration, by J. Parsons Schaeffer, A.M., M.D., Ph.D., Professor of Anatomy and Director of the Daniel Baugh Institute of Anatomy of the Jefferson Medical College; formerly assistant professor of anatomy, Cornell University Medical College, and professor of anatomy, Yale University Medical School. With 204 illustrations, of which 18 are printed in color. Philadelphia: P. Blakiston's Son & Co. Price $10.00 net.

This is a very extensive treatise on the subject and covers the ground in a most thorough manner. By omitting detailed observations and recording only essentials, the author has been able to make, through his descriptions, discussions and suggestions, the subject matter very comprehensive and instructive.

The work demonstrates to the specialist the necessity of not relying too much on average anatomy as learnt from books, but shows the importance of grouping human variants, a point well taken especially as applied to the nose and its paranasal sinuses.

His whole treatise on the embryology development and anatomy of the nose and its related parts has added a much needed book to the nose and throat specialty, and any one interested in this particular line of medicine would do well to add this book to his library.

RICHARD A. KEARNY.

DISEASES OF THE NERVOUS SYSTEM: A Text-book of Neurology and Psychiatry, by Smith Ely Jelliffe, M.D., Ph.D., formerly Professor of Psychiatry, Fordham University, New York, and formerly Adjunct Professor of Diseases of the Mind and Nervous System, New York Post-Graduate Medical School and Hospital; and William A. White, M.D., Superintendent of St. Elizabeth's Hospital, Washington, D. C., Professor of Nervous and Mental Diseases, George Washington University, and Lecturer on Psychiatry, U. S. Army and U. S. Navy Medical Schools. Third edition, revised, rewritten and enlarged. Cloth. Pp. 1018. Illustrated with 470 engravings and 12 plates. Philadelphia and New York: Lea & Febiger, 1919.

This differs from other works on the nervous system in that it proposes a new conception as regards classification, which has always been difficult in these disorders. Recently there has been so much done to prove the close inter-relation existing between the nervous system and the body as a whole, particularly the work of Crile and Cannon, that a method of approach which takes cognizance of this fact seems to be most opportune. The activities of the nervous system are considered to be those of the vegetative, the sensorimotor and the psychic.

It is evident that while the book is of considerable interest, admirably presenting a fund of valuable information, it will prove of doubtful utility to the medical student and the general practitioner, due in large measure to the fact that the writers neglect a judicial appreciation of most of the subject matter, which is so essential in a work purporting to be a text-book, substituting rather dogmatic conceptions in fields which are still debatable.

Considerable space, seemingly disproportionate in a work of the size, is given to disturbances of the vegetative nervous system.

The chapter on examination methods is well done, except that for the student sufficient attention is not given to detail, it being apparently taken for granted that the reader will be possessed of elemental knowledge.

It is readily apparent that the writers' devotion to the psychoanalytic school has led them to accept as fact theories as to the causation of many entities which are far from proven, and which will surely provoke the same criticism in this regard as did the previous editions. This same fault is shown throughout, that is, insufficient consideration of other conceptions as to the production of functional nervous disorders apart from those of the Freudian adherents.

This tendency is also shown in the space devoted to psychoanalysis.

The portion devoted to the psychoses is excellent, clearly, succinctly and interestingly presenting the various entities.

Typographically the book has been well done. Many of the illustrations are quite familiar, having been borrowed from other authors. It is hoped that in the next edition an effort will be made to make the book more balanced, and with broader conceptions which will lend it to better utilization as a text-book, to which it could be so well adapted.

R. SHEEHAN.

PATHOLOGY OF WAR GAS POISONING, by M. C. Winternitz. Pp. 163, 41 colored plates and 83 half-tone photomicrographs and drawings. Yale University Press, 1920. Price, $20.00.

This beautifully illustrated and printed work gives in detail the pathology of war gas poisoning as studied at the Brady Laboratory, Yale University, by Major M. C. Winternitz, Medical Corps, and his coworkers. The unit at Yale formed a portion of the Medical Science Section of the Chemical Warfare Service and was concerned in studying the pathology of experimental gas poisoning upon animals. The work includes a detailed description of the macroscopic and microscopic pathology observed in poisoning by chlorine, phosgene, chlorpicrin, superpalite, mustard, cyanogen chloride and bromide, arsin, and poisoning with organic arsenic compounds. In justice to the author it should be said that there is no more complete a description of the pathology of gas poisoning extant than is given in this work, and he is to be congratulated upon the results obtained in his laboratory.

One of the most interesting and important chapters in the book describes certain preliminary studies upon intratracheal therapy, and are most significant of what can be accomplished in animals by this method of therapy. The author shows that large quantities of salt solution can be passed through the lung with safety and that perfusion in this manner washes out a large proportion of the material introduced into the lungs. The experiments were made with India ink, protargol, starch paste and bacteria. Winternitz shows that moderate quantities of fluid, *i. e.*, up to the capacity of the lung, can be insufflated without difficulty, and that pulmonary irrigation is possible and there are no attendant ill effects. He considers that the experiments suggest the possibility of an intratracheal therapy based either upon intratracheal insufflation or upon pulmonary irrigation.

The book is beautifully illustrated with 41 colored plates and 83 half-tone illustrations upon plate paper. The large number of colored plates undoubtedly accounts for the cost of the work. The plates and drawings were made by artists connected with the Army Medical Museum and loaned to the Brady Laboratory for this purpose and the personnel aiding in these studies was assigned to the Brady Laboratory from the Laboratory Division of the Surgeon General's Office, U. S. Army.

Obituary

Those of our membership whose deaths have been noted since our last report are as follows:

Maj. John M. Benedict, M. C., Conn. N. G.
1st Lieut. Witfield W. Crook, M. C., U. S. Army.
Maj. Gen. William C. Gorgas, M. C., U. S. Army.
Maj. John B. Hereford, M. R. C., U. S. Army.
1st Lieut. Thomas R. Hillard, M. R. C., U. S. Army.
1st Lieut. Joseph D. Lyle, M. R. C., U. S. Army.
Capt. Benj. G. Pool, M. C., D. C. N. G.
Dr. John W. Ross.

W. C. Braisted.

THE
MILITARY SURGEON

Vol. XLVII SEPTEMBER, 1920 Number 3

PHYSIOTHERAPY AT THE U. S. NAVAL HOSPITAL, NEW YORK, N. Y.[1]

By Captain C. H. T. LOWNDES, M. C., U. S. N.; Captain F. E. McCULLOUGH, M. C., U.S.N.; Captain A. M. FAUNTLEROY, M. C., U. S. N., and Commander WM. SEAMAN BAINBRIDGE, M. C., U. S. N. R. F.

(With seventy-eight illustrations)

IN THE military services, the earliest use of physical therapeutics may be said to be the so-called "setting up exercises." In the Navy, these were the exercise successors for the personnel of the sailing-ship days of "wooden ships and iron men," whose evolutions aloft in a gale furling or close-reefing topsails—one hand for Uncle Sam and the other for himself—or on deck manning the foretopmast stay sails halyards and hauling on the main brace afforded about all the physical exercise needed. When it came time for Jack's watch below, he never suffered from insomnia and the hoarse call of the bo'sun's mate, "All the starboard watch" (or perhaps the port), had to be supplemented by many "Roust out there, you sleepers," before Jack swung himself out of his hammock to the deck.

With the evolution of steam the sailor's environment has radically changed and the picturesque Jack Tar, with his deep-sea roll, is almost a memory. The engine room and the turret are not so conducive to broad chests and ruddy cheeks as were wind-swept decks.

In consequence, it became necessary to provide systematic exercises to replace those that were lost through abandonment of the sail as a motive power. Calisthenics of the "follow the leader" type, generally accompanied by music, were in use for many years and were not altogether satisfactory. As pointed out by Capt. J. A. Murphy, M. C., U. S. N., "the aim of exercise should be to correct faulty posture or deformities, strengthen weak muscle groups, improve nervous control and coordination to obtain a quicker response to the will, improve the appetite, digestion and absorption; thus improving metabolism so as to increase body weight (muscle) and burn up excess of food (fat) and to strengthen the heart and lungs." The present system of physical training used in the United States Navy today, which is based on the Swedish system, seems to fill every requirement except for deformities which are the result of traumatism or gross disease.

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[1] Read at annual meeting of the Association of Military Surgeons of the United States, New Orleans, La., April 22, 1920.

Physiotherapy is one of the lessons of the great war. While it was practiced more or less before the war, it was not generally intelligently applied. Thus, the lack of interest in physiotherapy by the medical profession in general has given rise and opportunity for the development of strange and weird cults of pseudoscientific medical (?) men, not properly trained even in the elements of general medicine and surgery. It is now time for the legitimate medical profession to reclaim that which should be included in the restoration to normality of the physically handicapped. The recent establishment of chairs of physiotherapy in some of the medical departments of our great universities indicates that this branch of medicine will not in the future be neglected as it has been in the past.

When it is remembered that in the year 1919, over 500,000 artisans and tradesmen in the United States received occupational injuries in following their vocations, the importance of placing physiotherapy on an intelligent basis is easily seen.

The Barnes Hospital in St. Louis, Missouri, has one of the best equipped plants in this country. Apparatus for physiotherapy and hydrotherapy is being installed in some of the big hotels, health resorts and clubs in this country and even on some of our trans-Atlantic lines. In these beginnings there is great hope for encouragement. A warning, however, must be sounded. Physiotherapy, when intelligently applied, has a large field of usefulness—but it must be borne in mind that this entails the use of definite physical agents with potentialities of harm as well as good; there must be perfect coördination and proper training to bring about the desired results. Just as a certain drug is ordered for the purpose of producing a certain result, so must definite physical agents also be applied. Wet heat may act entirely differently from dry heat and instead of benefiting a patient, positive harm may be done by the injudicious use of physiotherapeutic agents. In order to obtain the full benefits of physiotherapy, not only is a good plant necessary, but a trained personnel under skillful direction, which will produce the greatest efficiency at the least possible risk of danger, is imperative.

In September, 1919, at the U. S. Naval Hospital, New York, N. Y., the plan was consummated for the efficient care of cases requiring the essentials of physiotherapy. In October, 1919, the plant was in running order, splendidly equipped, and supervised by those who were specially trained along this line of endeavor. Since then something like twenty-five thousand treatments have been carried out.

The excellent results which were obtained, and the fact that the hospital staff realized more and more the importance of this work and so sent an increasing number of patients for treatment, made it necessary to enlarge the department. Cases which hitherto had not been considered in the class of those that could be helped by the methods of physiotherapy were sent to the department, and were materially benefited thereby.

It is the aim of the hospital to try to apply in every way the lessons learned from the war. The Bureau of Medicine and Surgery has been keenly alive to the efforts made, and has given every possible aid.

To present a clear idea of what is being done, to those who cannot personally visit the hospital, a series of pictures has been selected, with explanatory notes attached, showing the physiotherapeutic department with its various subdivisions.

Figures 6, 7, 8, and 9 show some of the ward work. Physiotherapeutic treatment is carried on not only in rooms specially fitted for the purpose; there is also much of it done in the wards.

Figures 10, 11, 12, 13, 14 and 15 show a squad of amputés to whom special exercises are being given to improve the general condition and the muscular tone of the stumps. Too often in the past the muscles in the stumps would become atrophic with large deposits of fat, necessitating a long period before they could be rendered in fit condition for the application of the permanent leg. Time is saved and a much better functional result is obtained by keeping the muscles in as good condition as possible through physiotherapeutic means.

A chief petty officer is giving the exercises.

It is to be noted that two of the men present have crutches. One case has been amputated at the hip-joint, and the other has a stiff hip on the non-amputated side. These are legitimate reasons for the presence of crutches. One of the principal lessons of the war is that crutches should be done away with as much as possible, for often the effect, both mental and physical, of their continued use, is not of the best.

Hiking squads are very carefully selected, so that those cases who have become proficient in walking are sent with men with like injuries, who are just beginning to walk. Thus, there is always encouragement and obvious example of progress.

Certain games develop the power of balance and aid the amputé in getting accustomed to the new limbs (see Fig. 20). The playing of billiards or pool is not only of help as an amusement for the men, but has its distinct therapeutic value. Various games are prescribed for different cases.

Light duty, as shown in Figs. 21, 22, 23, and 24, is of practical benefit. During the convalescent stage the patient is given a definite task to perform each day. This awakens in him a sense of once again being of use, and the duty which is given to him is especially assigned for the development of that particular part of the body which needs such exercise.

In order to enlarge the department to the required capacity, it was necessary to move it to another part of the hospital building, that is, all but the hydrotherapy branch, which remained at its first site and utilized, in addition, part of the vacated space.

Figs. 25 to 37, inclusive, show the work in the enlarged physiotherapy department.

It is very important that all records be carefully kept and that examination of the patients be made at stated intervals. This is done not only to determine the progress and to change the treatments as may be advisable, but for the psychological effect upon the men and the aides.

In the experience of many it has been proved that very frequently scar tissue harbors active organisms for many months after the wound has apparently healed. In fact, organisms have been found in scar tissue from one to two years after healing. It has been established that it is advisable, as a rule, to give physiotherapeutic treatment to a member for a period of months before introducing a bone graft (see Fig. 38).

Much of the apparatus, as shown in Figs. 46 to 64, incl., will be recognized by many as the inventions and modifications of Maj. R. Tait McKenzie. The hospital is greatly indebted to him for having personally supervised the construction of the McKenzie apparatus, and for inspecting it after its completion.

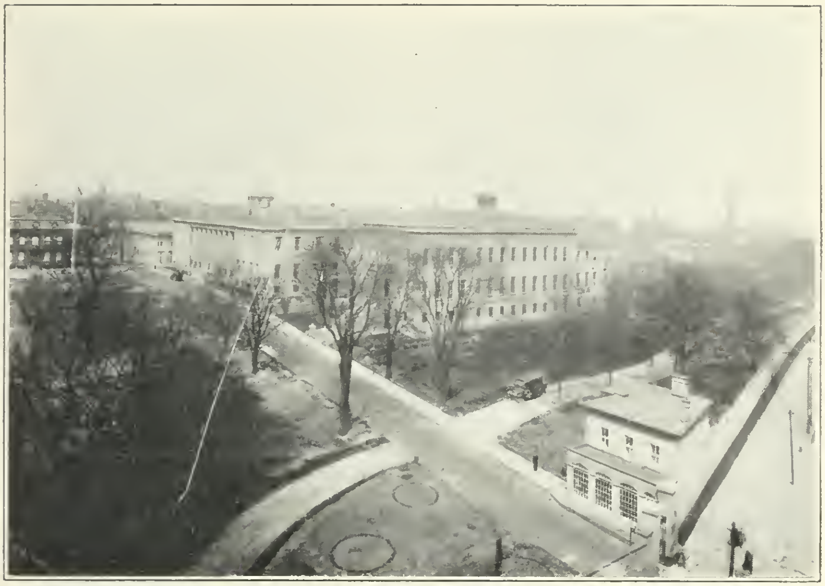

Fig. 1.—General View of some of the Hospital Buildings. U. S. Naval Hospital, New York, N. Y.

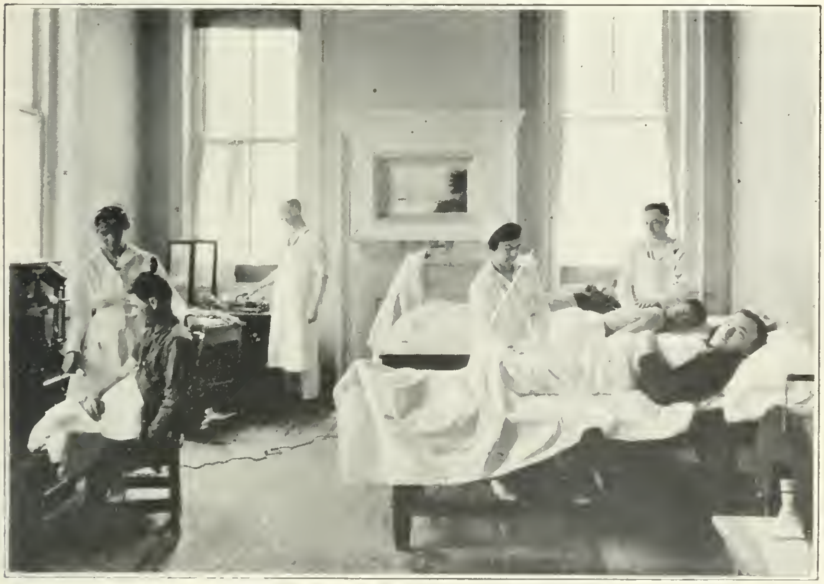

Fig. 2.—Physiotherapy Plant as first installed. Large Room. Massage—High Frequency—Faradism.

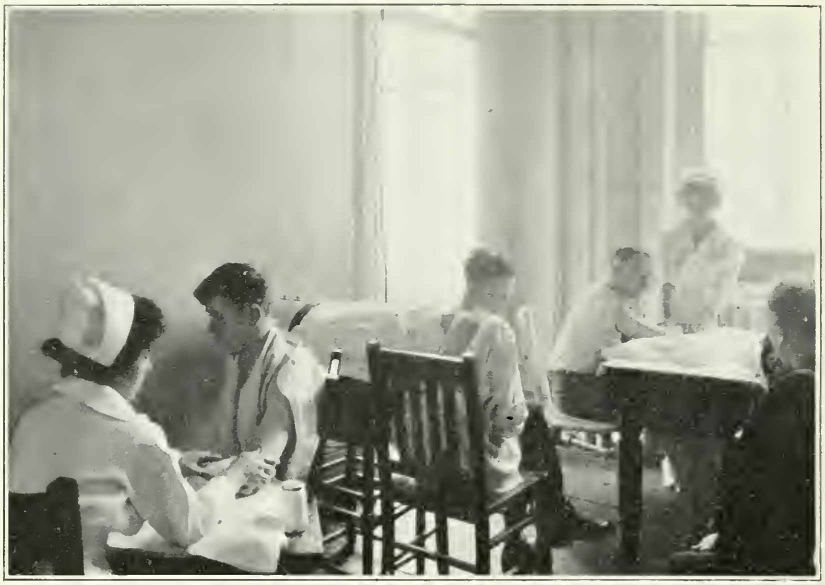

FIG. 3.—Physiotherapy Plant as first installed. Small Room. Baking—Radiant Heat—Massage.

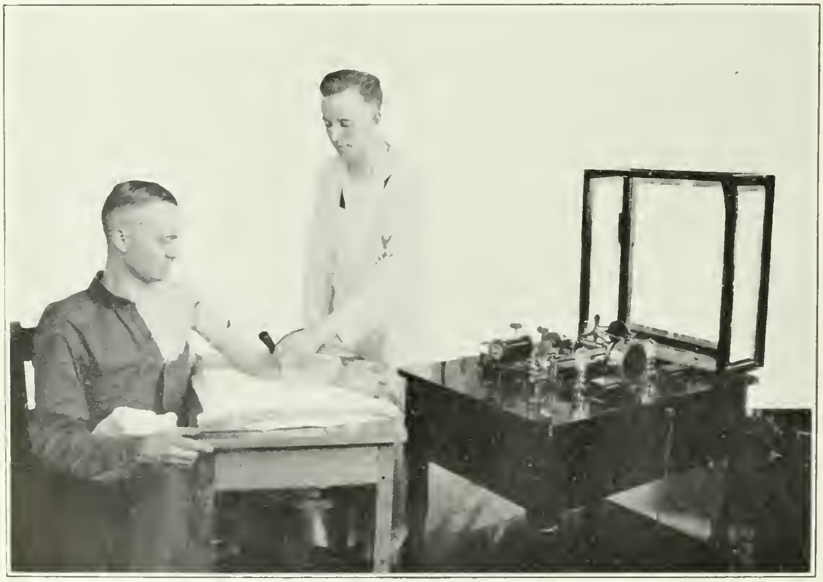

FIG. 4.—Physiotherapy plant as first installed. Small Room. Faradic Current.

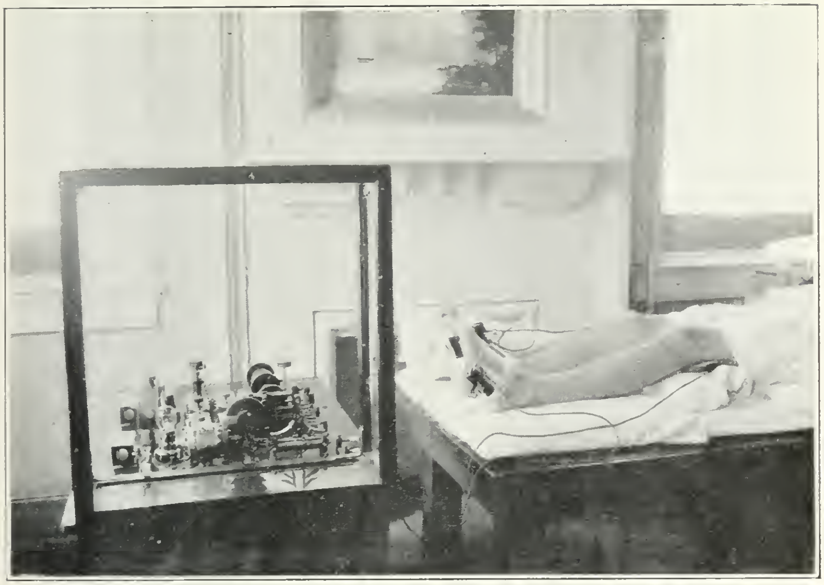

Fig. 5.—Physiotherapy Plant as first installed. Small Room. Use of Sinusoidal current.

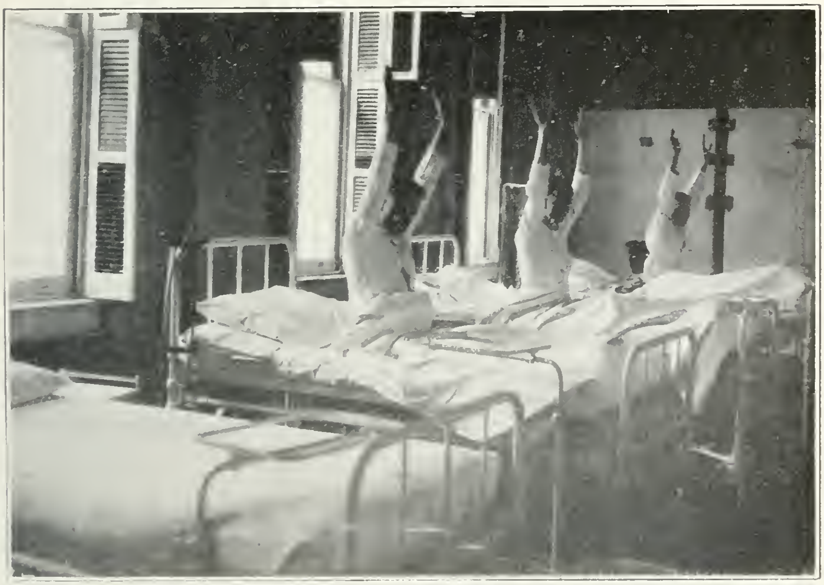

Fig. 6.—Three patients with delayed union of fractured femurs having setting up exercises in bed to help respiration and circulation, and thereby improve general condition and affect indirectly the bone repair process. (Pictures 6 and 7.)

Fig. 7.

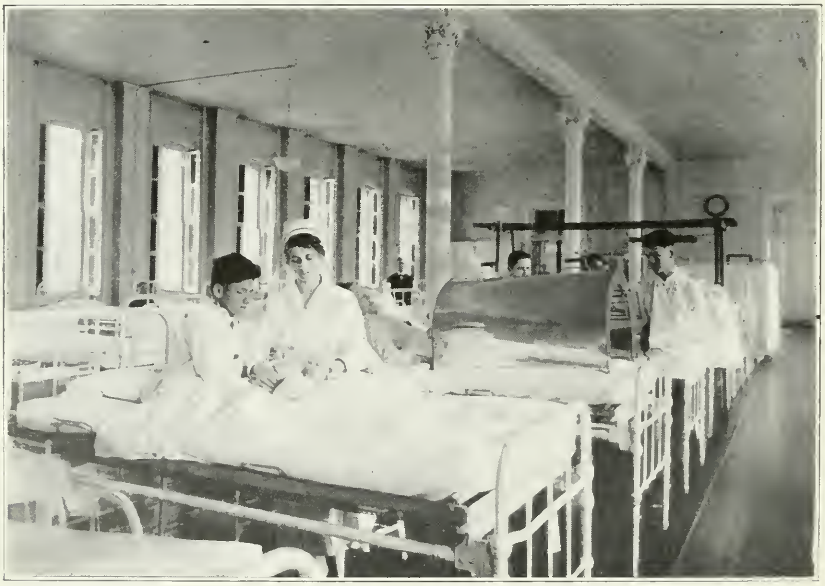

Fig. 8.—Bed Cases. Massage and radiant heat.

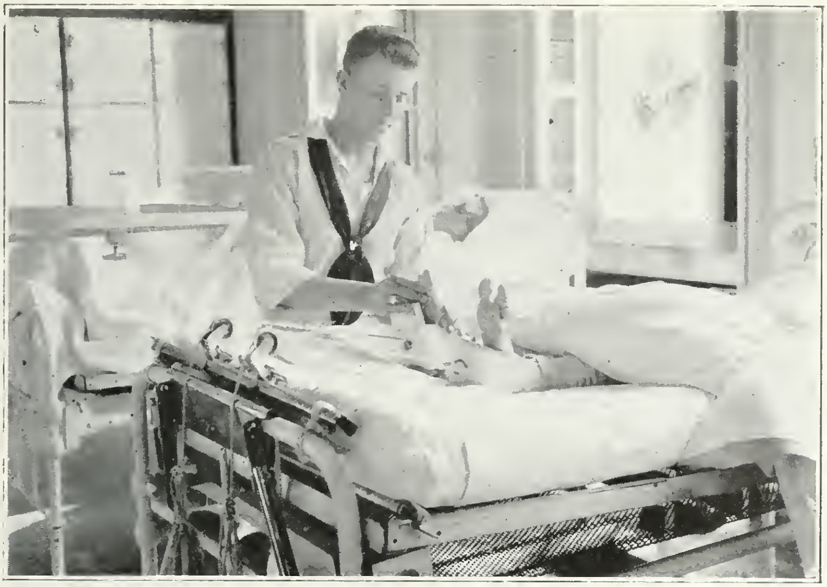

Fig. 9.—Corpsman massaging feet and correcting tendency to drop foot.

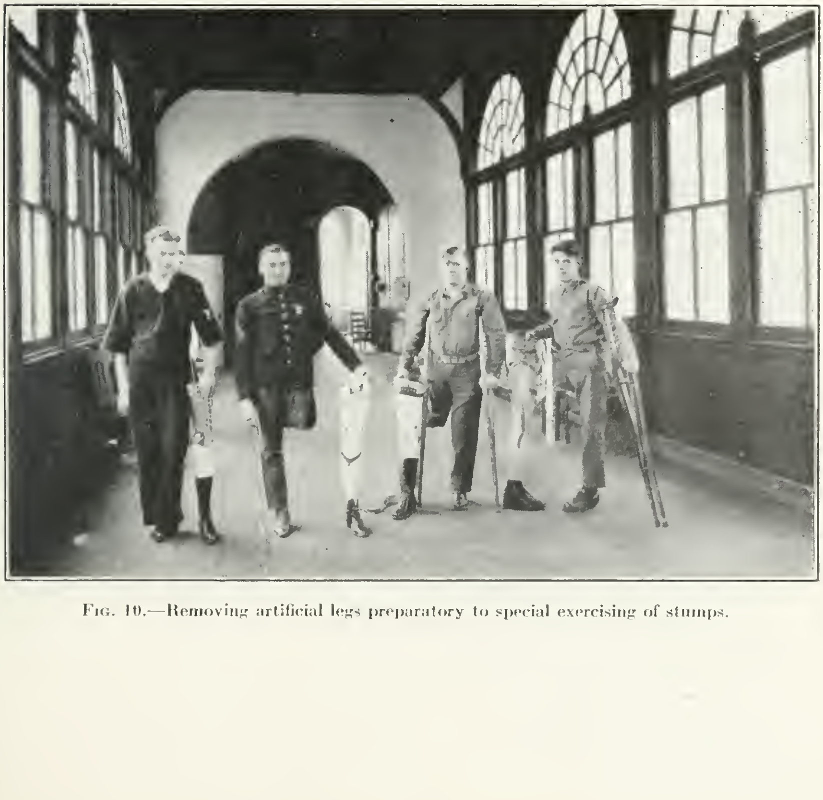

Fig. 10.—Removing artificial legs preparatory to special exercising of stumps.

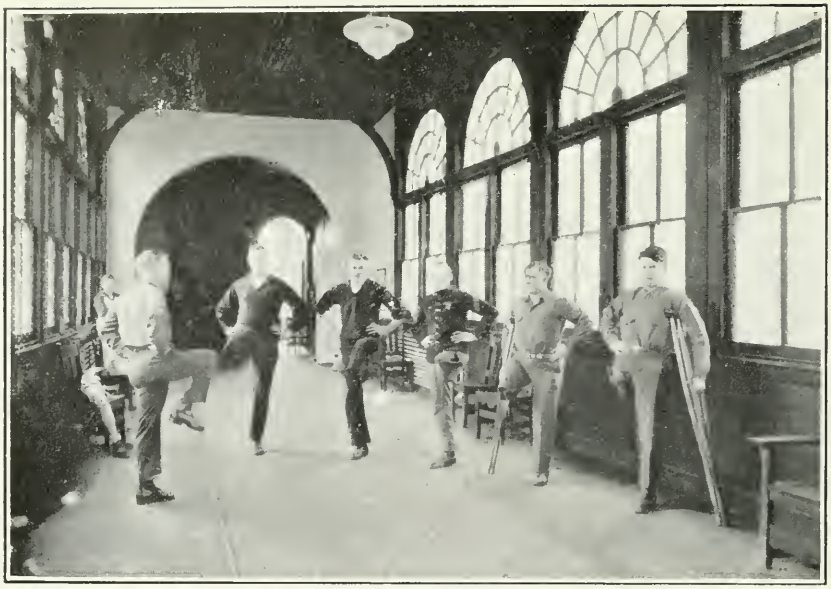

FIG. 11.—Special exercises for stumps.

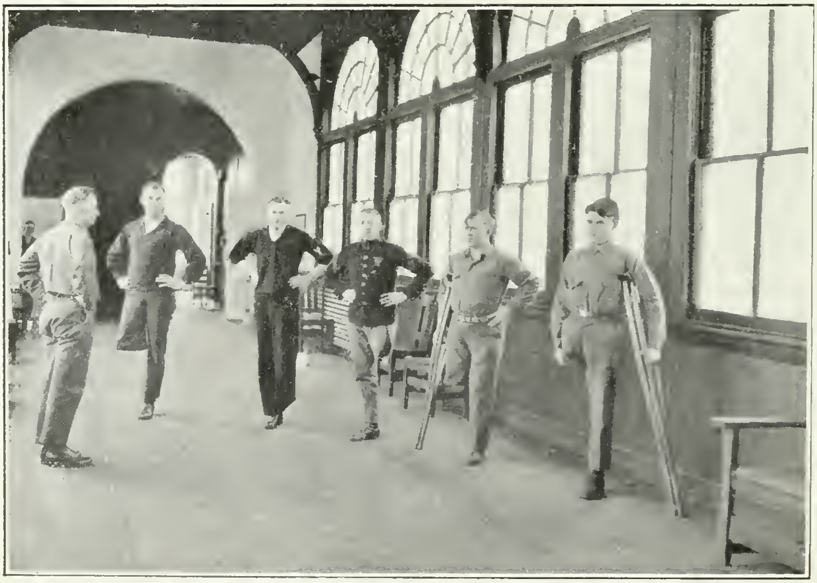

FIG. 12.—Same as Fig. 11.

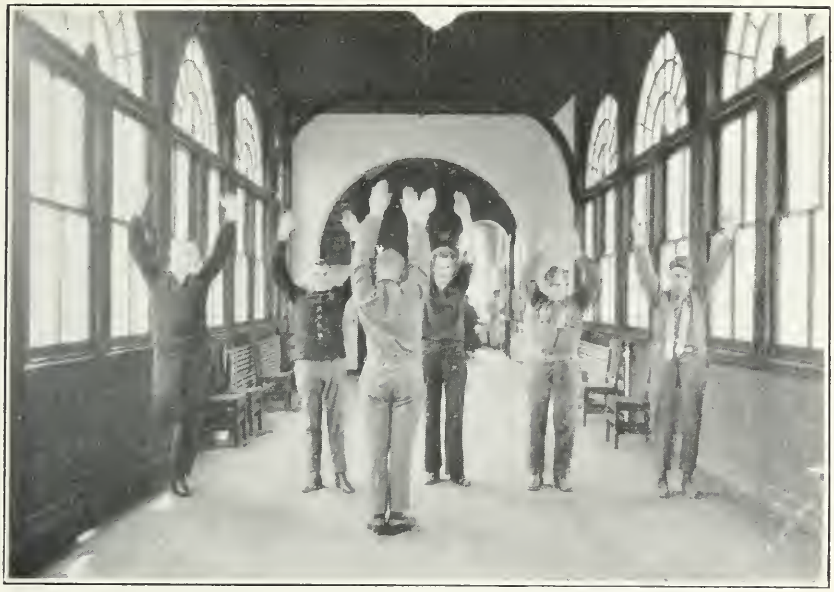

FIG. 13.—Setting up exercises with artificial legs in use.

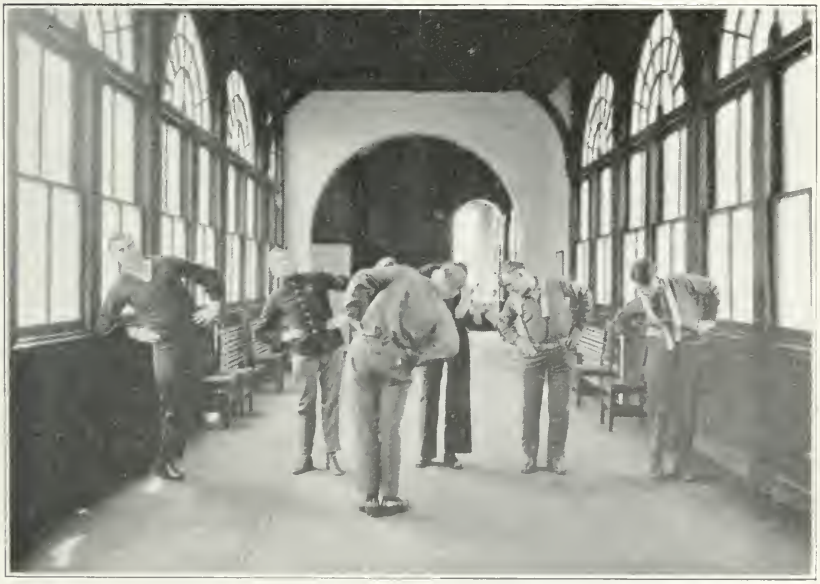

FIG. 14.—Same as Fig. 13.

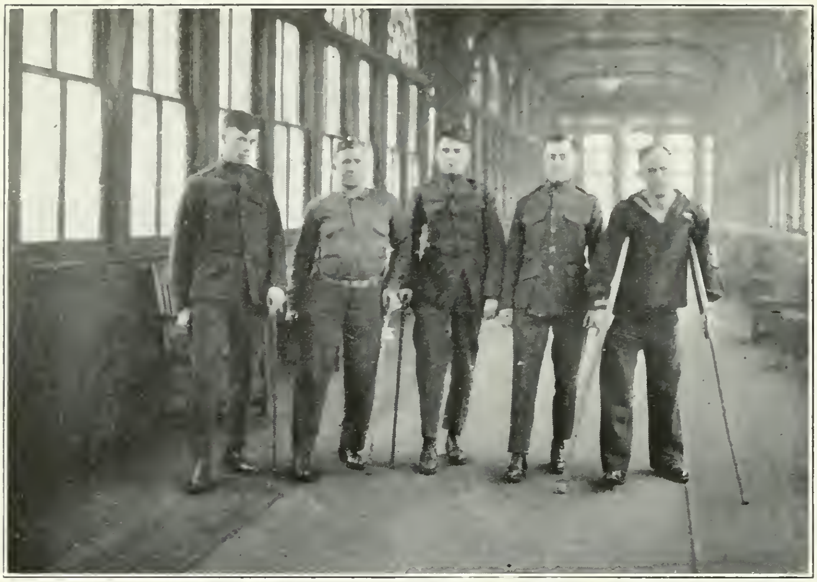

FIG. 15.—Amputes sent out daily on "hikes" in small squads.

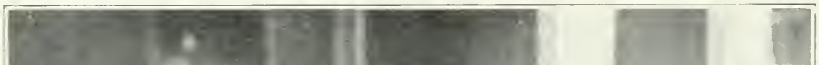

FIG. 16.—Amputated case treated by the new method of early application of provisional splints. Two weeks after amputation.

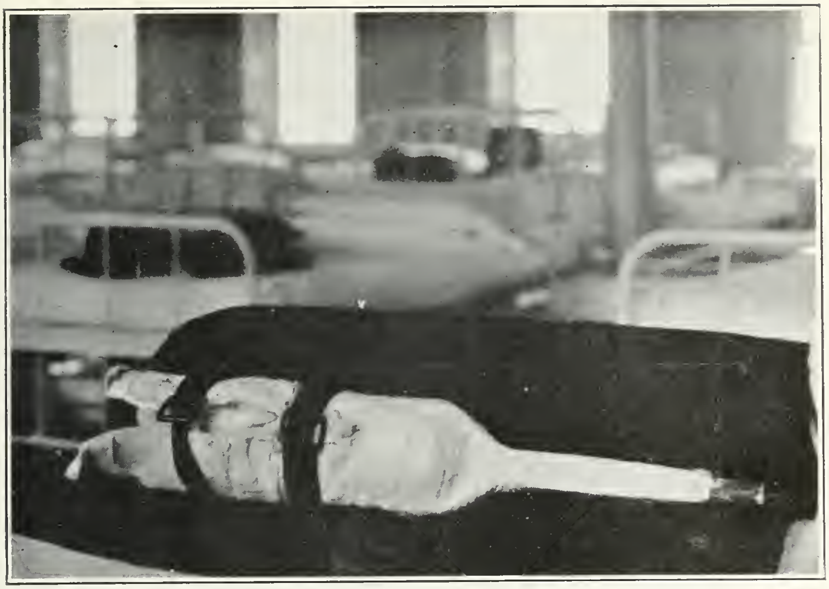

Fig. 17.—Improvised Peg Leg.

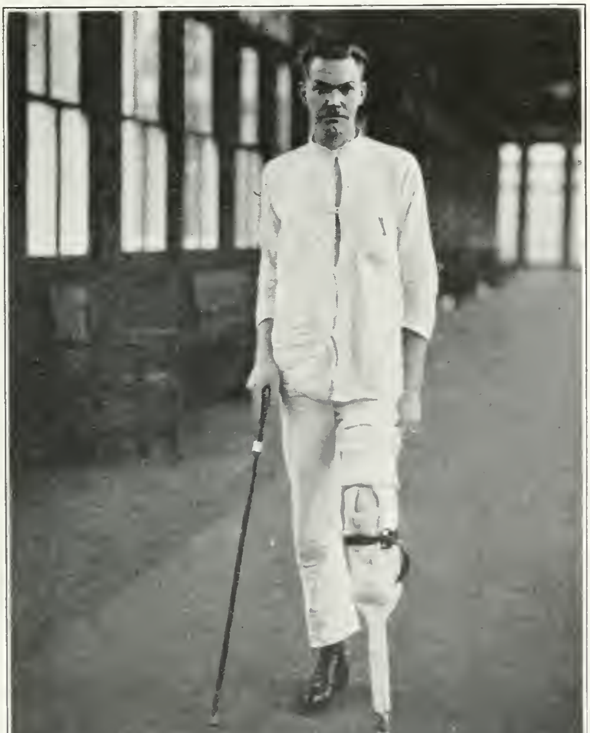

Fig. 18.—Man walking on a temporary splint. Such splint can be made by a nurse or corpsman. As there is no end bearing the splint can be applied before the part is entirely healed, by padding and by having the support some distance from the end of the stump

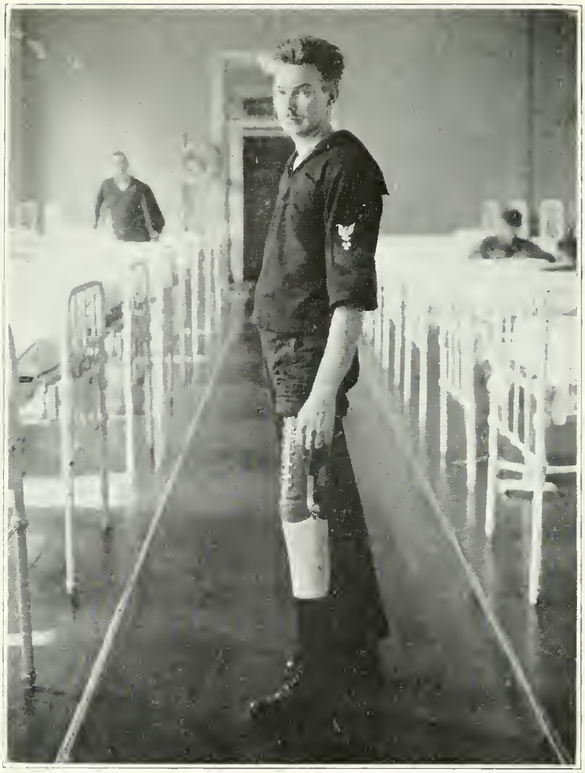

Fig. 19.—After eight weeks permanent artificial leg applied. Long process of stump shrinkage avoided.

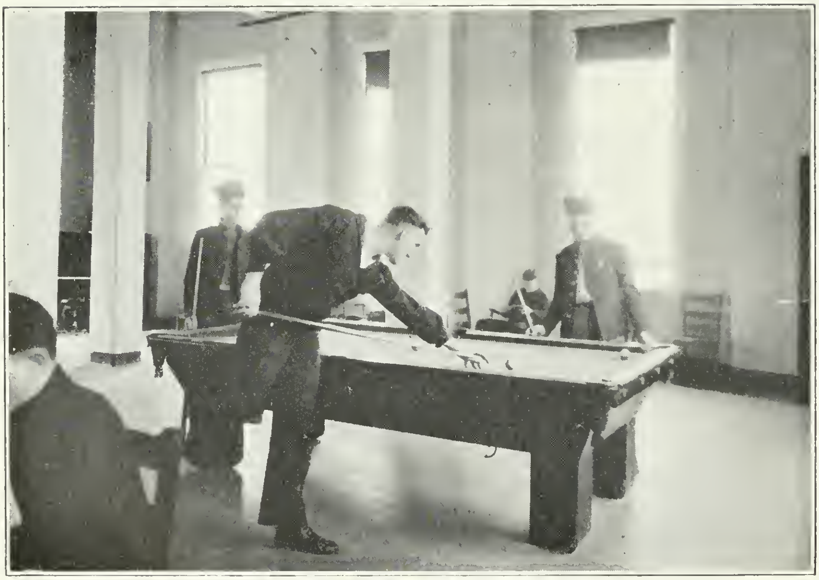

Fig. 20.—Playing Billiards. Two men with permanent artificial legs applied. The other man is not yet ready for permanent leg. He is beginning to use temporary leg part of each day.

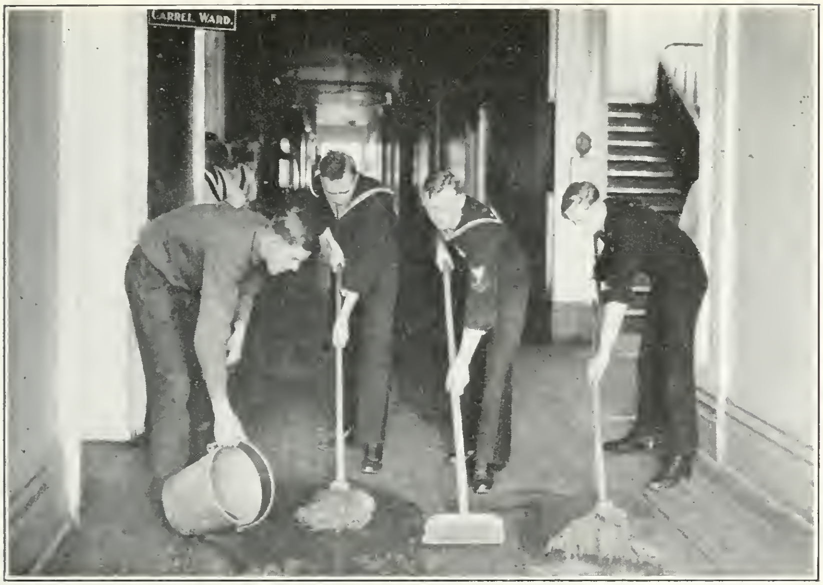
CARREL WARD.

FIG. 21.—Three cases of empyema: one of non-union of left humerus, which recently had a bone graft inserted.

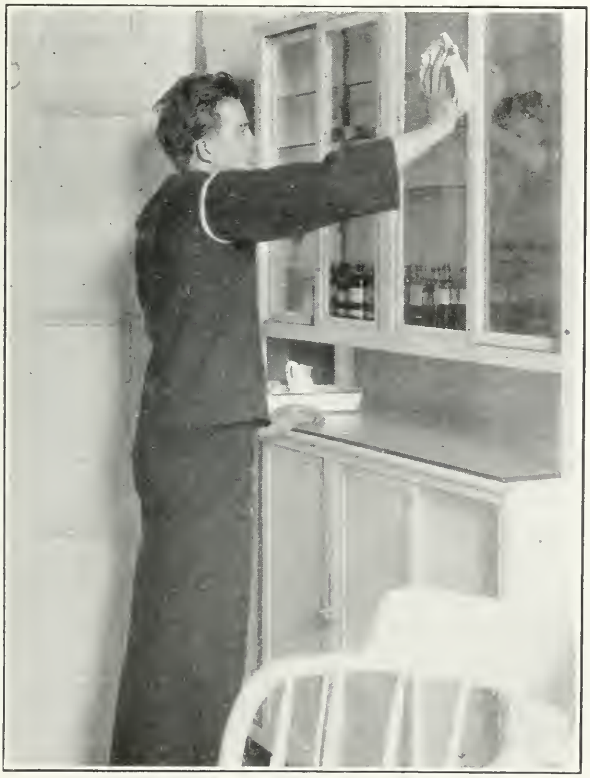

FIG. 22.—Light duty for the development of wrist and shoulder.

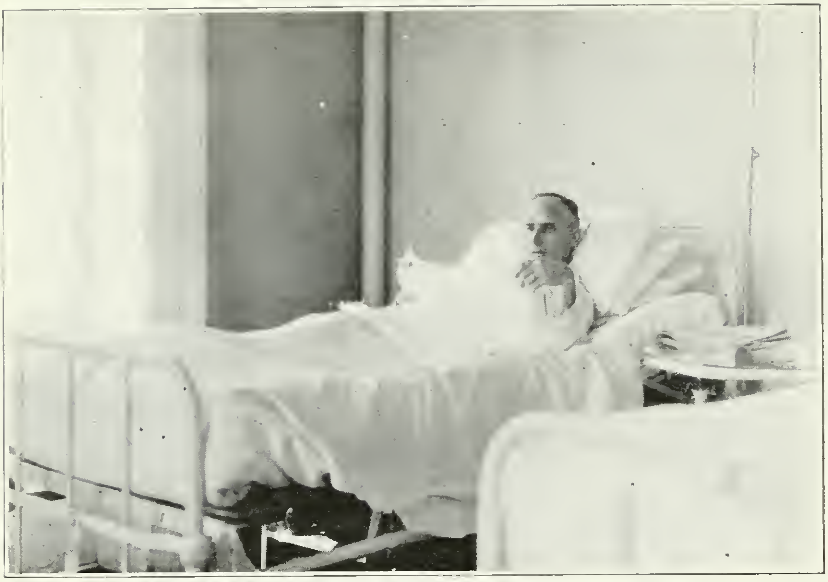

Fig. 23.—Making dressings in bed.

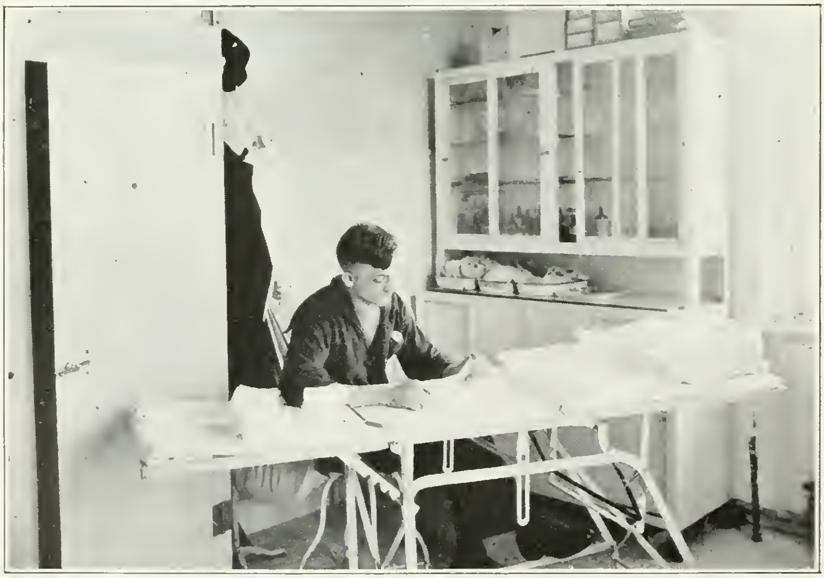

Fig. 24.—Interested in surgical work, and so is given work to do along his mental bent. Making dressings.

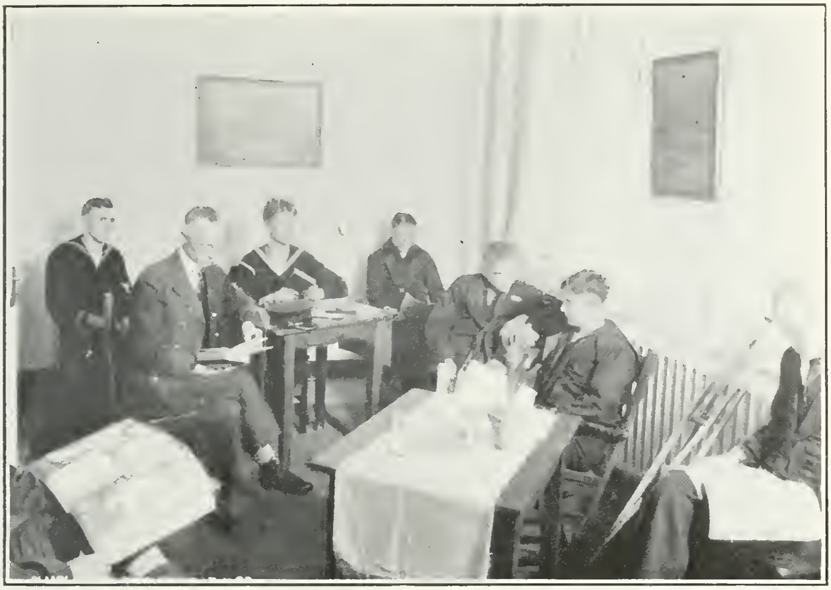

FIG. 25.—Waiting room for patients. Carefully equipped with books, games, papers and beautiful scenes other than those of war. Everything selected to help the mental as well as the physical morale.

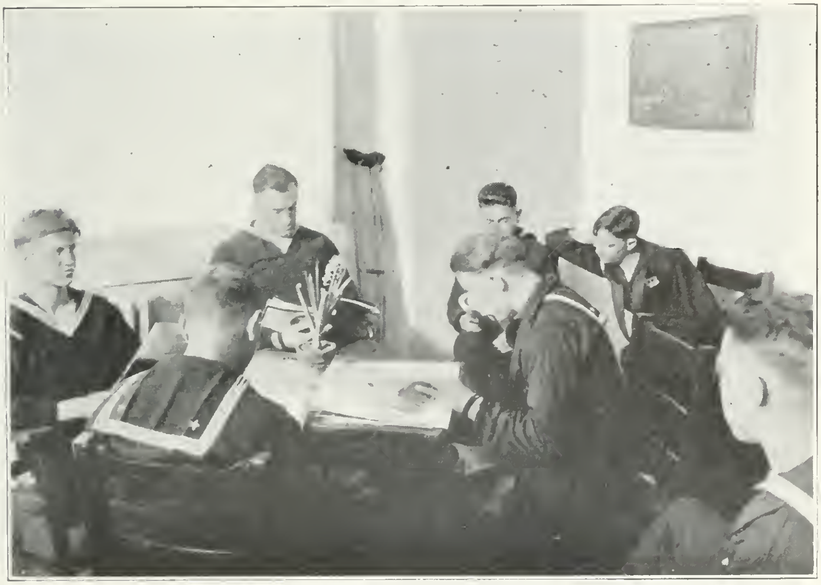

FIG. 26.—Waiting room for patients. View No. 2.

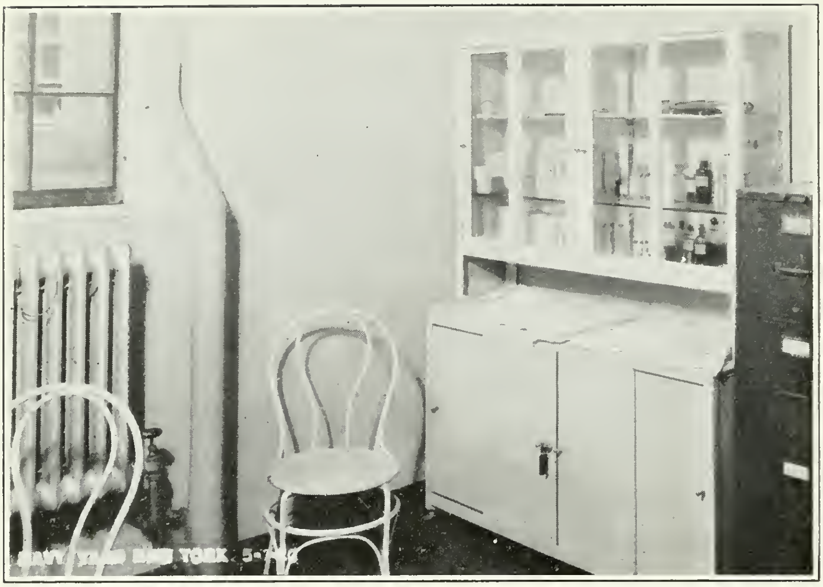

Fig. 27.—Office Record Room.

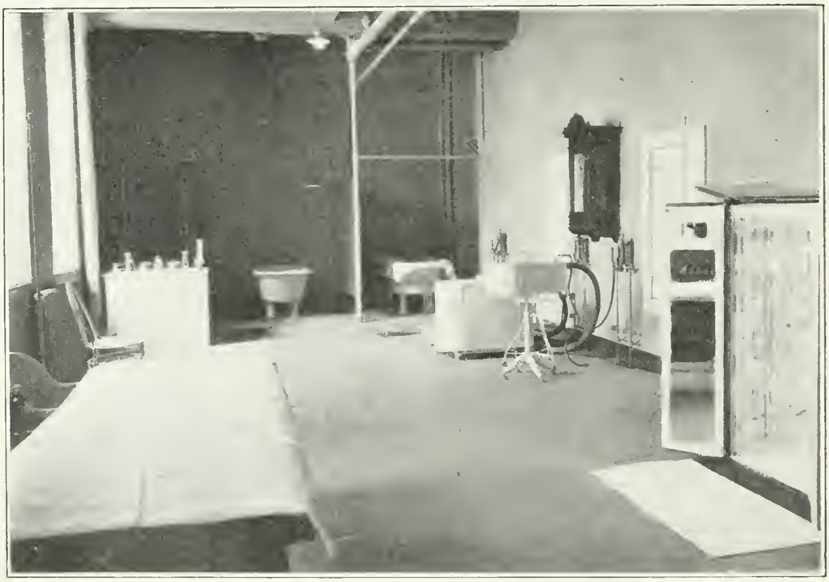

Fig. 28.—A Section of large hydrotherapy room.

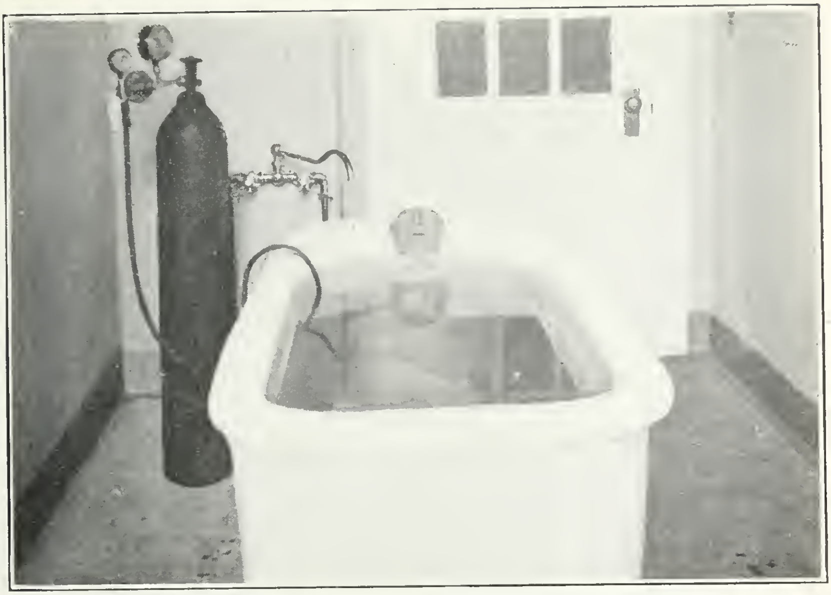

FIG. 29.—Quiet hydrotherapy room for Nauheim bath treatment.

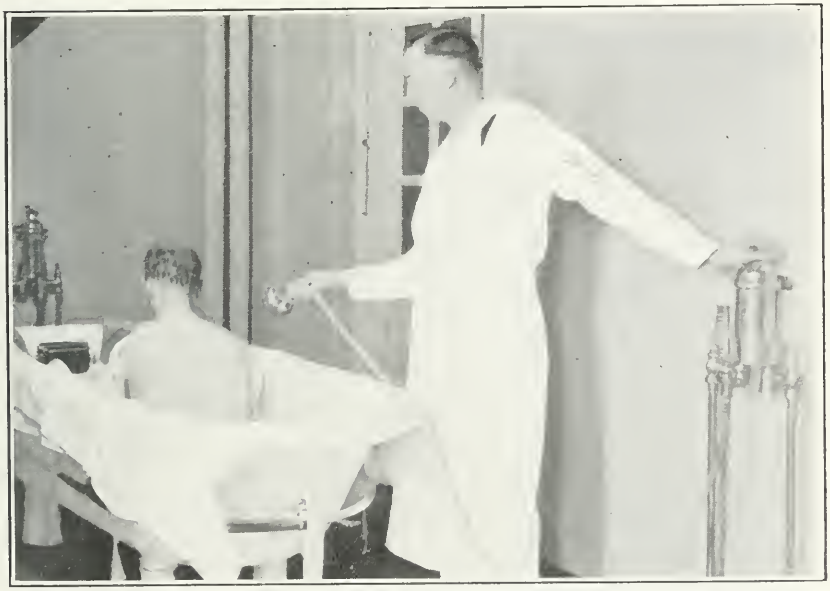

FIG. 30.—Hot bath with cold spinal spray.

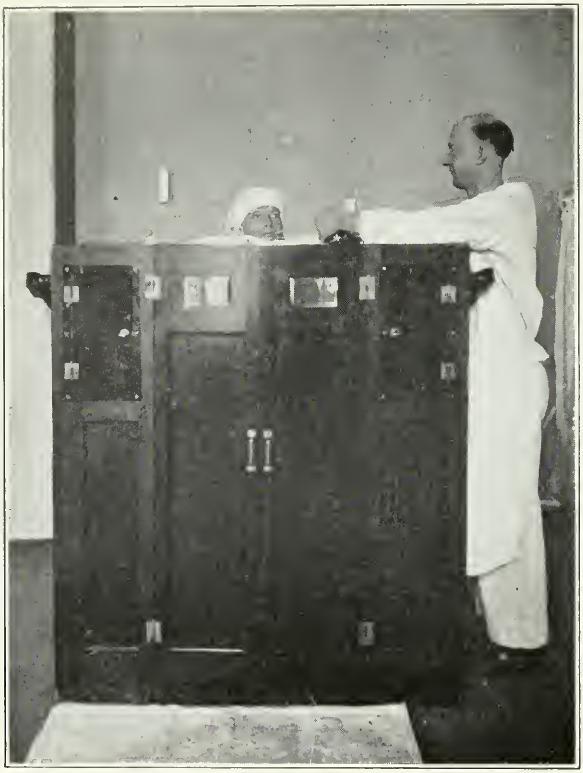

FIG. 31.—Cabinet bath for rheumatism and fat elimination.

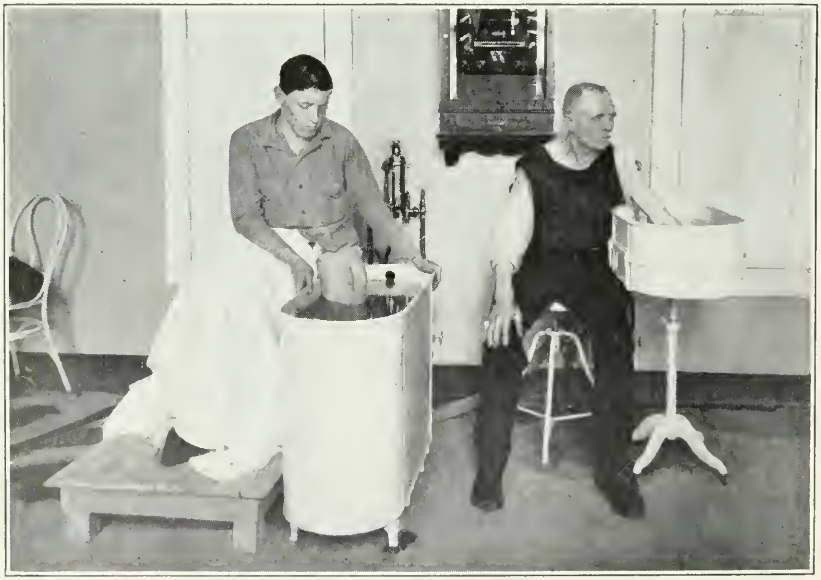

FIG. 32.—Whirlpool baths proved valuable in softening scar tissue, healing sluggish wounds, treating painful stumps, etc.

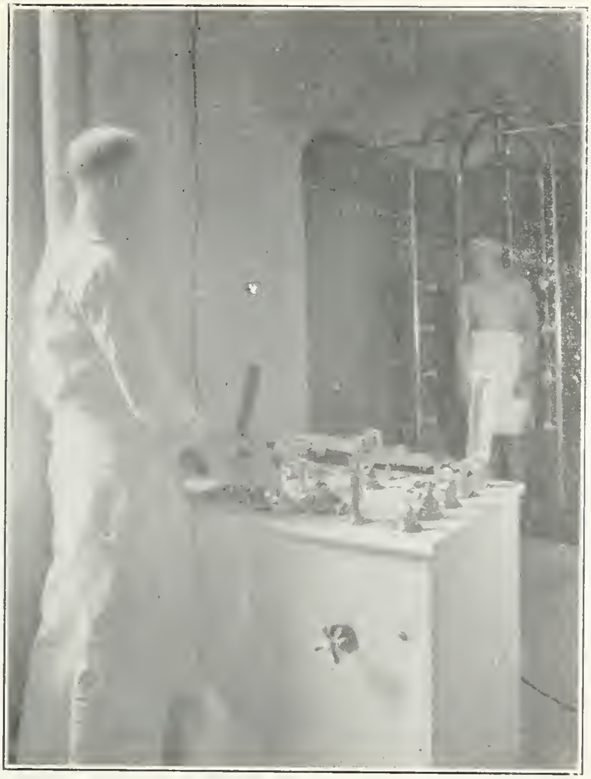

Fig. 33.—Scotch douche shower, etc.

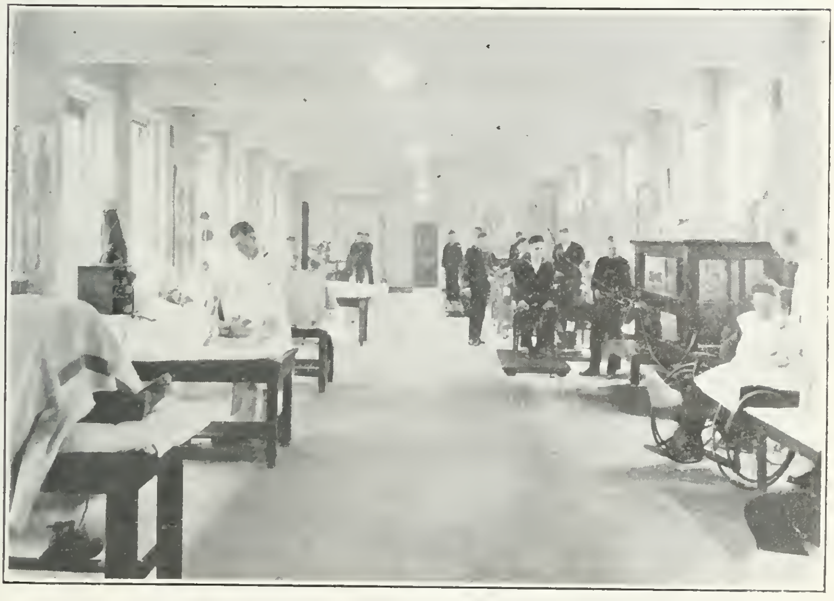

Fig. 34.—Functioning in large physiotherapy room.

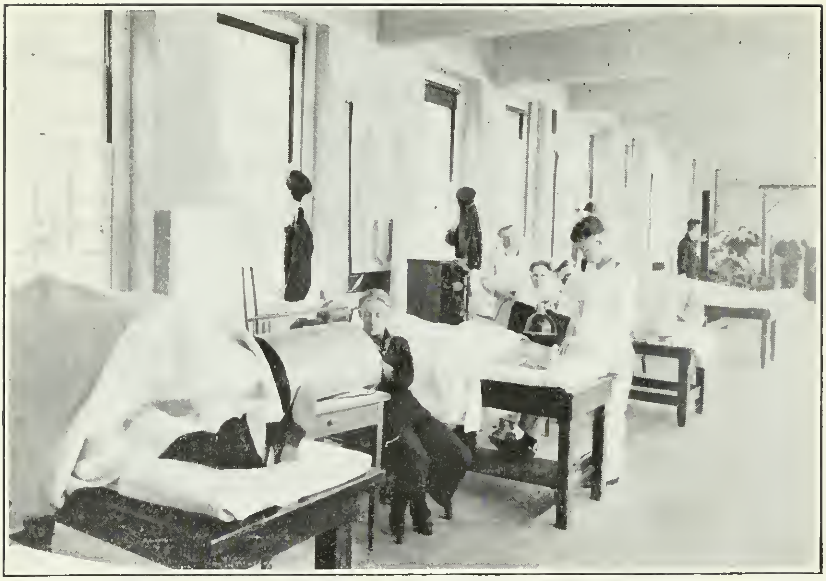

Fig. 35.—Thermotherapy; radiant heat to arm; heliotherapy; high frequency current; mechanotherapy in distance.

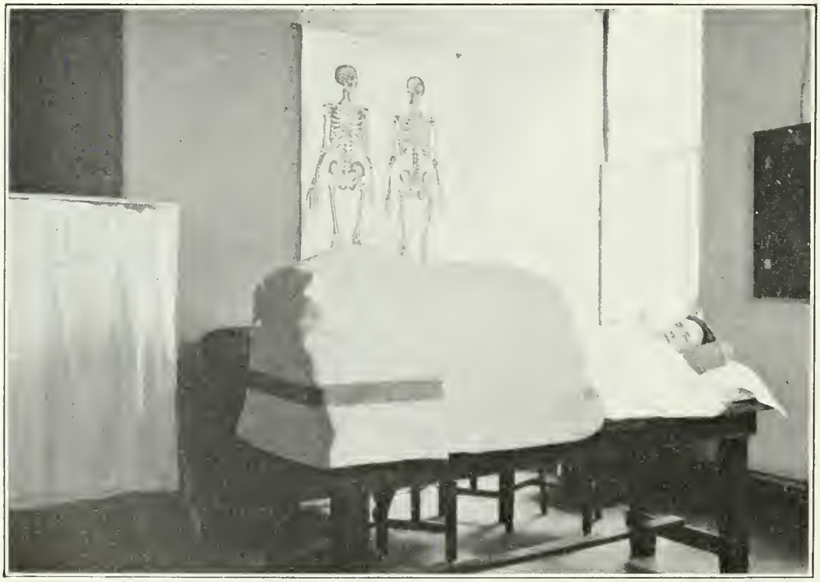

Fig. 36.—Large radiant heat apparatus. Rheumatic case being treated.

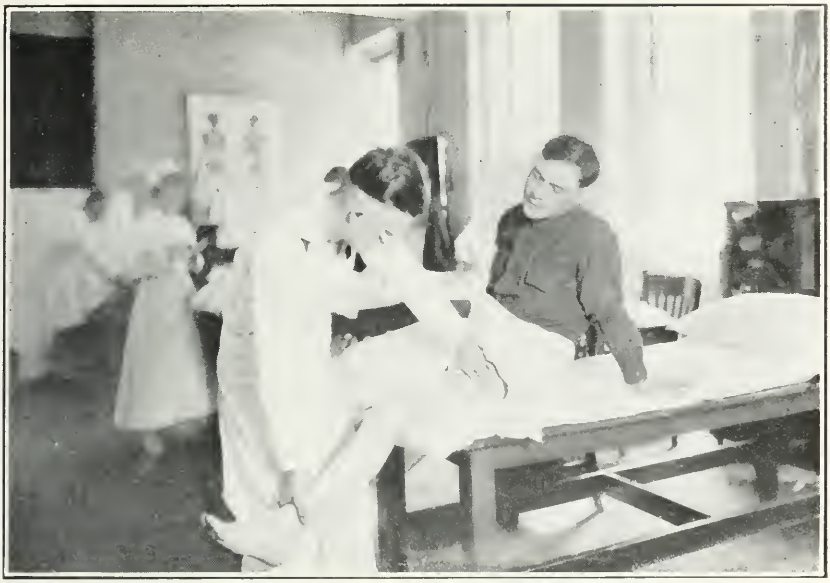

Fig. 37.—Manipulation of knee to prevent ankylosis, before wound in thigh is fully healed.

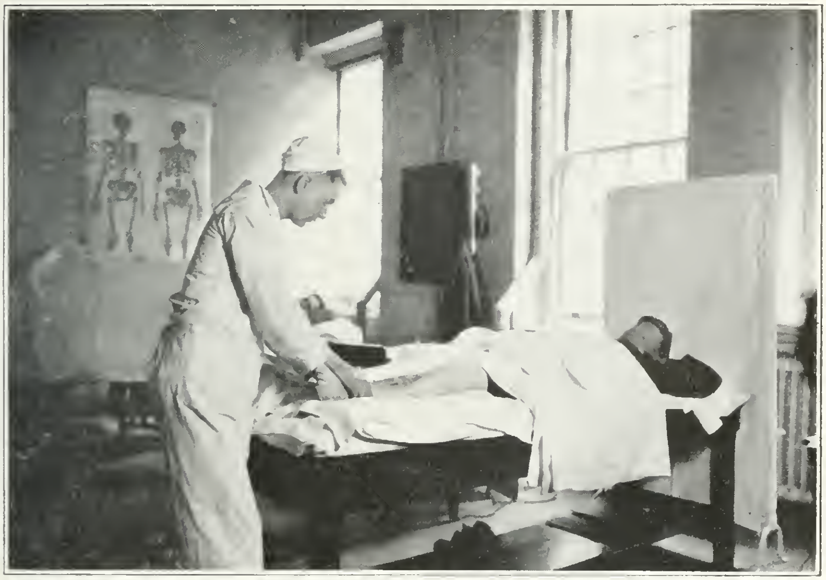

Fig. 38.—Massage of scar tissue preparatory to bone-grafting.

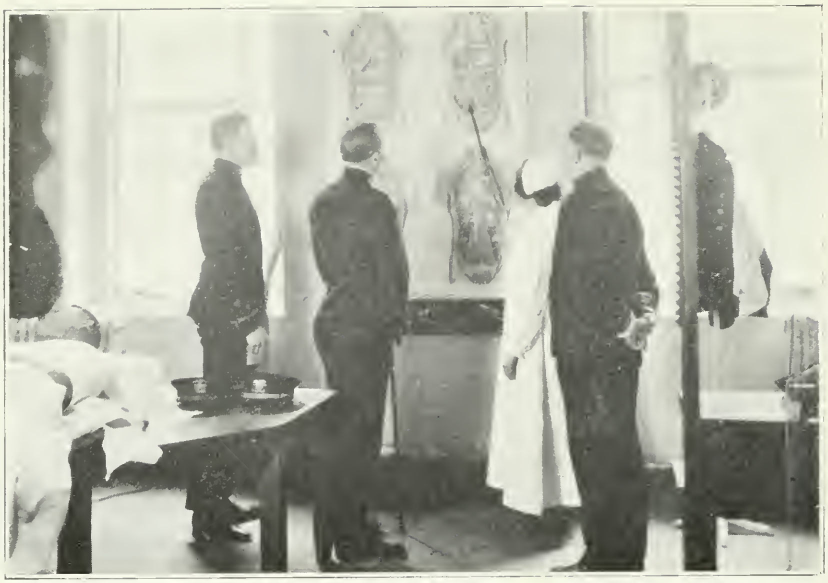

Fig. 39.—Wall charts are valuable in full view of patients and aides. They are of interest to the patients and of help to the manipulators. Three officer-patients unconscious of picture being taking, asking questions of one of the nurses in the department.

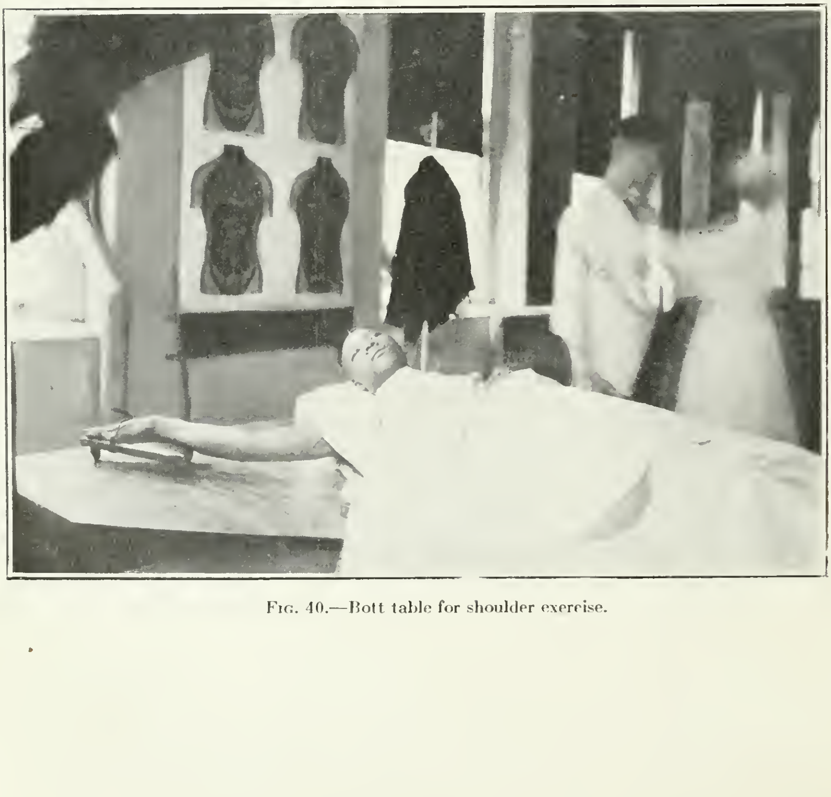

Fig. 40.—Bott table for shoulder exercise.

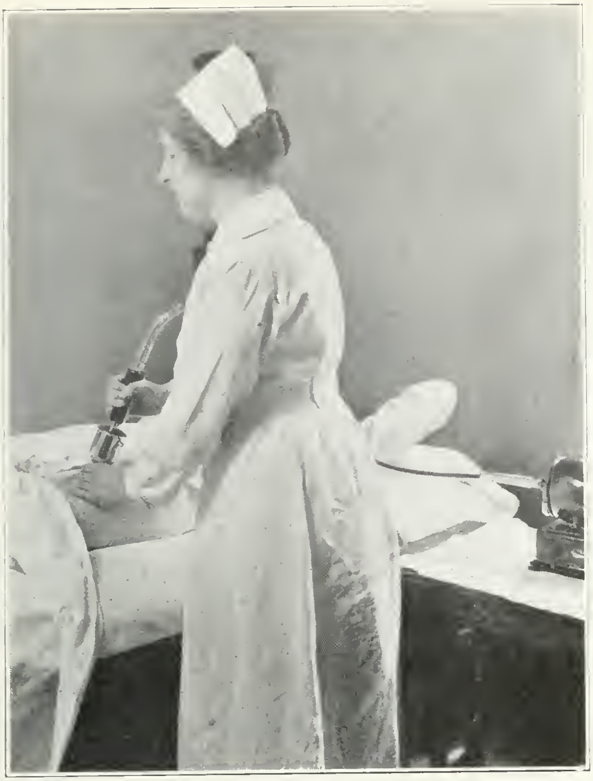

Fig. 41.—Examining room which is also used for treatment of special cases—nurses' and officers' families. Various electric connections have been installed so that it is possible to give treatments here. Vibratory massage being given.

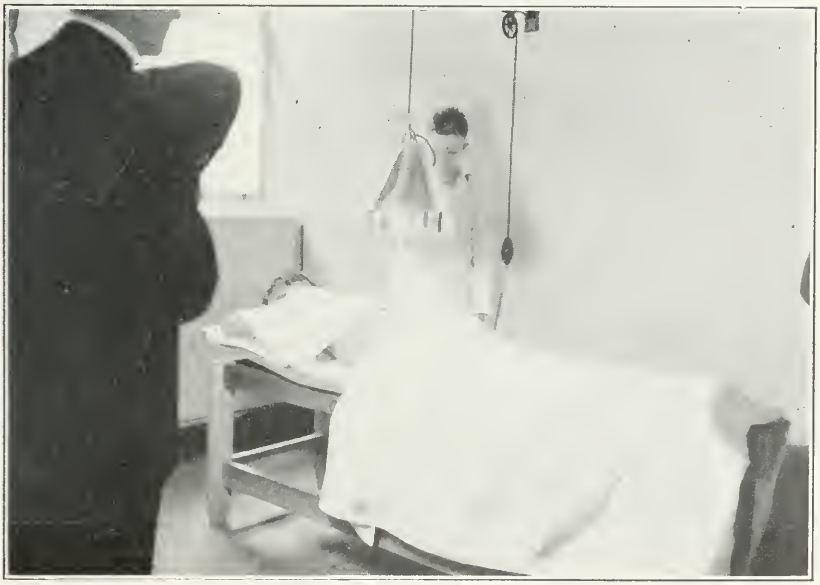

Fig. 42.—Leucodescent light in use.

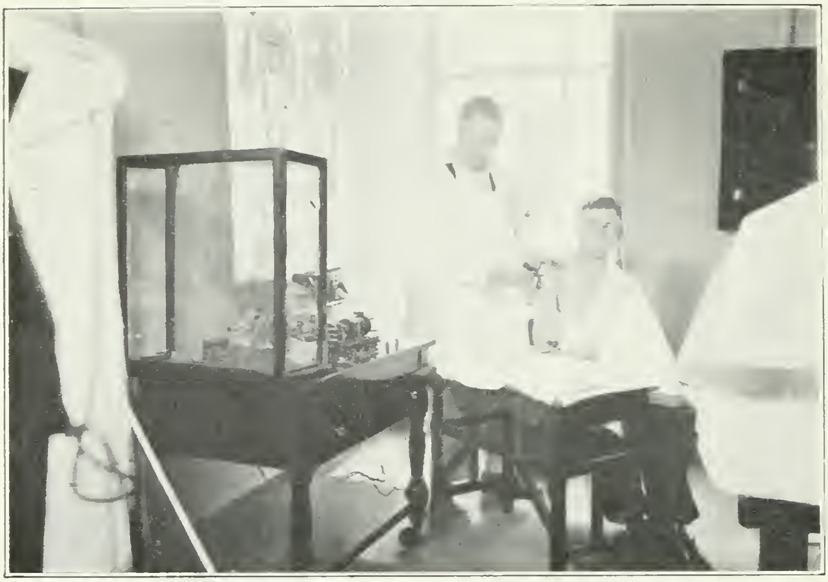

Fig. 43.—Galvanism

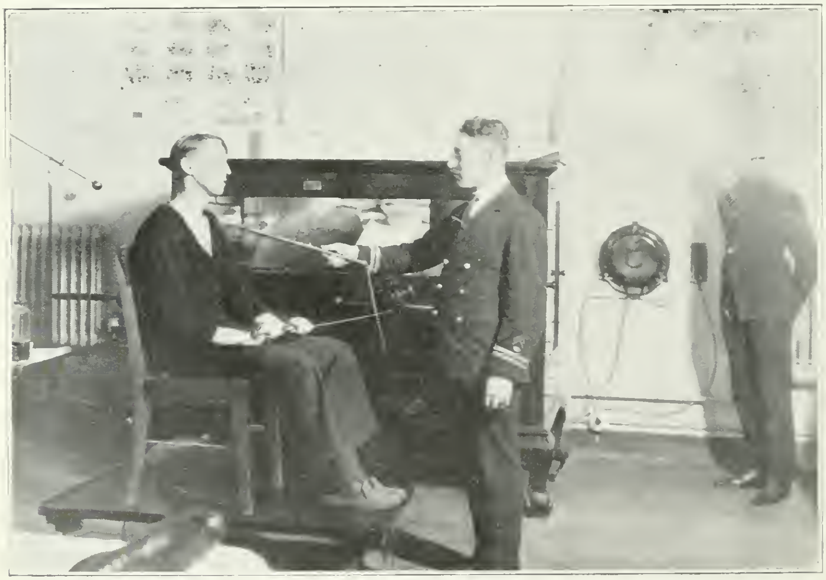

Fig. 44.—Case of hysterical aphonia being treated by static current.

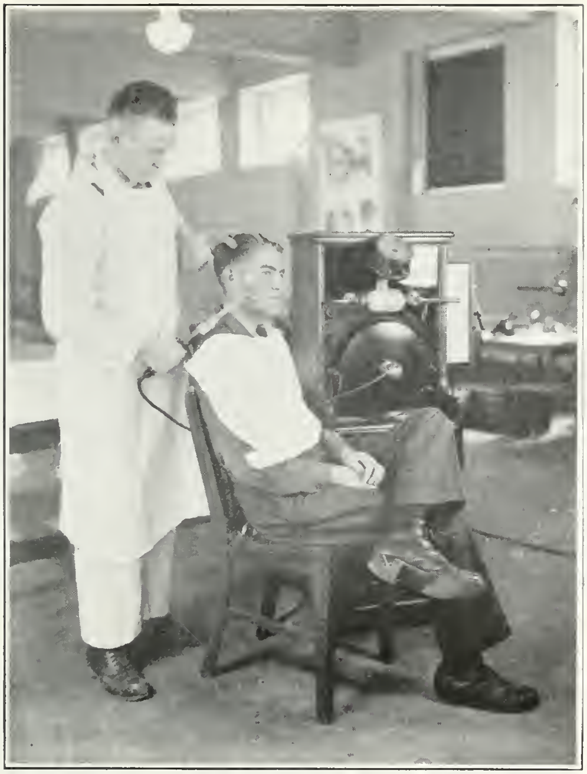

Fig. 45.—Application of high frequency current.

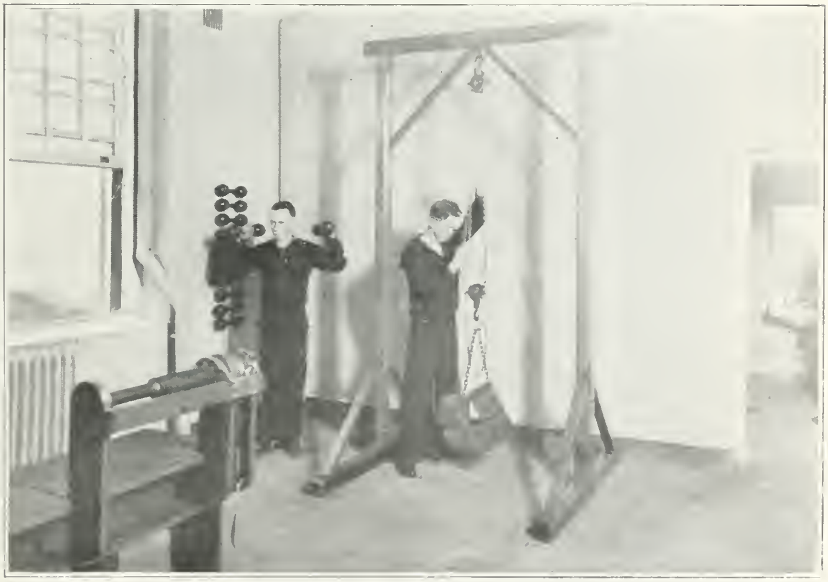

Fig. 46.—Dumb-bells and shoulder hoist in use.

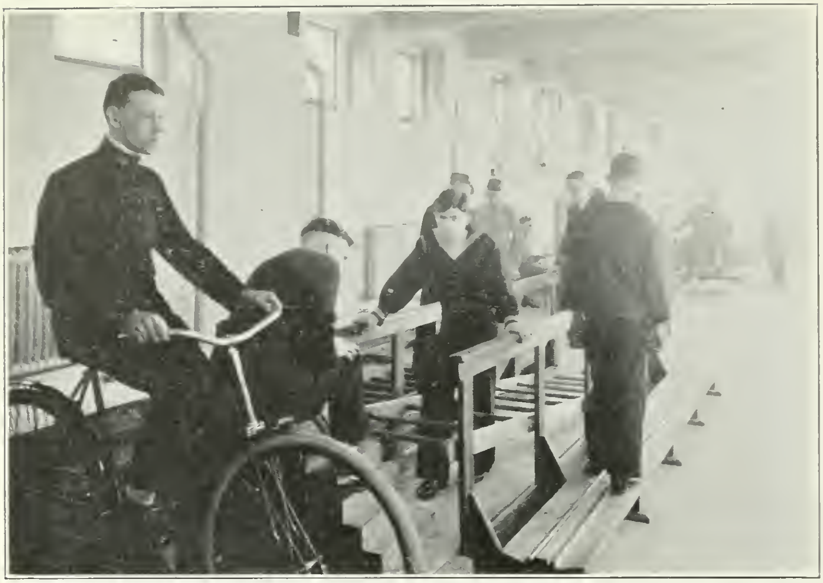

Fig. 47.—Group of leg cases using various apparatus.

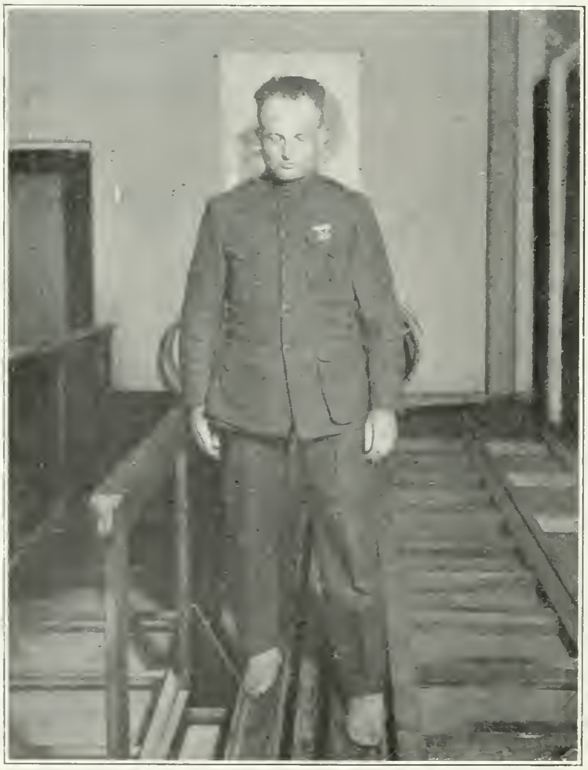

Fig. 48.—Inversion treads in use.

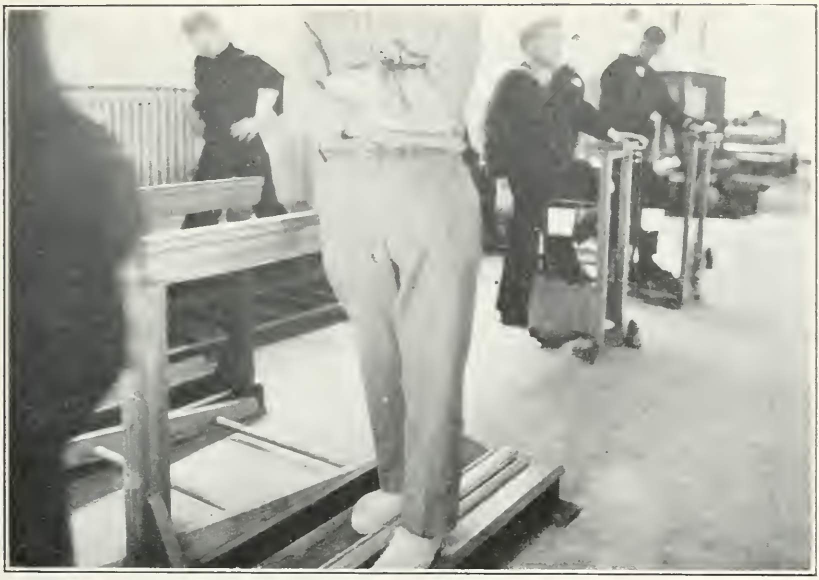

FIG. 49.—Eversion treads in use.

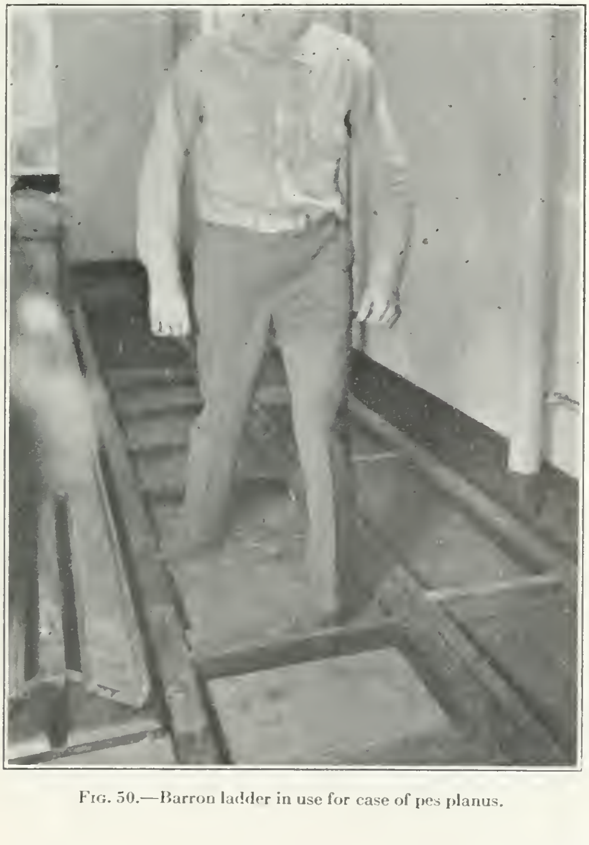

FIG. 50.—Barron ladder in use for case of pes planus.

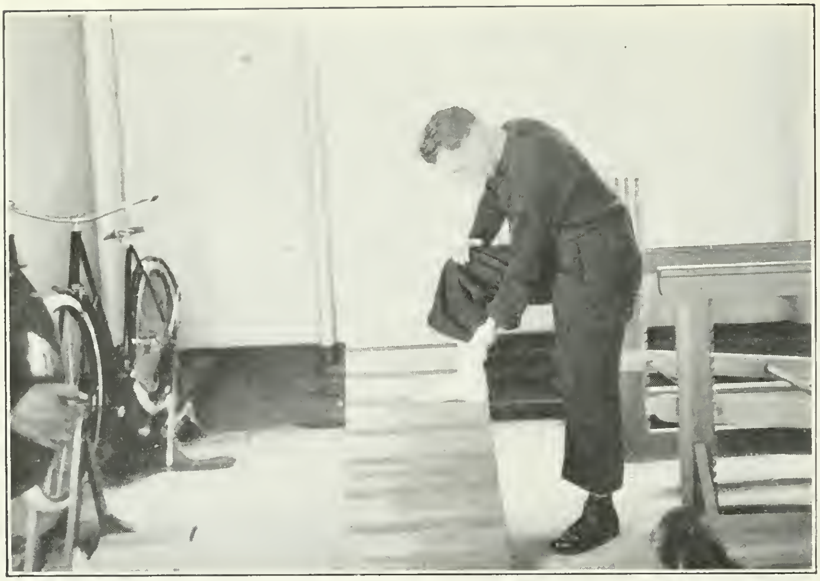

FIG. 51.—Muscle and tendon stretching ladder. Excellent for shortened tendo Achilles.

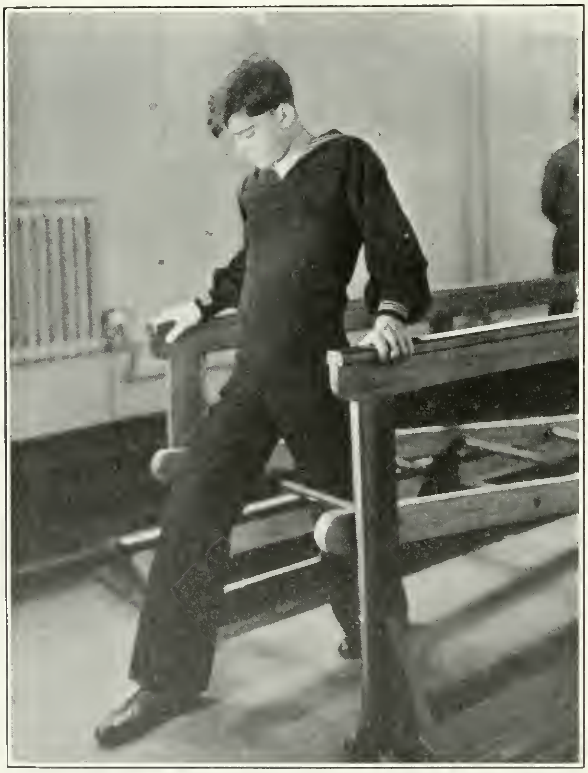

FIG. 52.—Ladder for stiff knees and exercising stump with teaching control in using artificial legs.

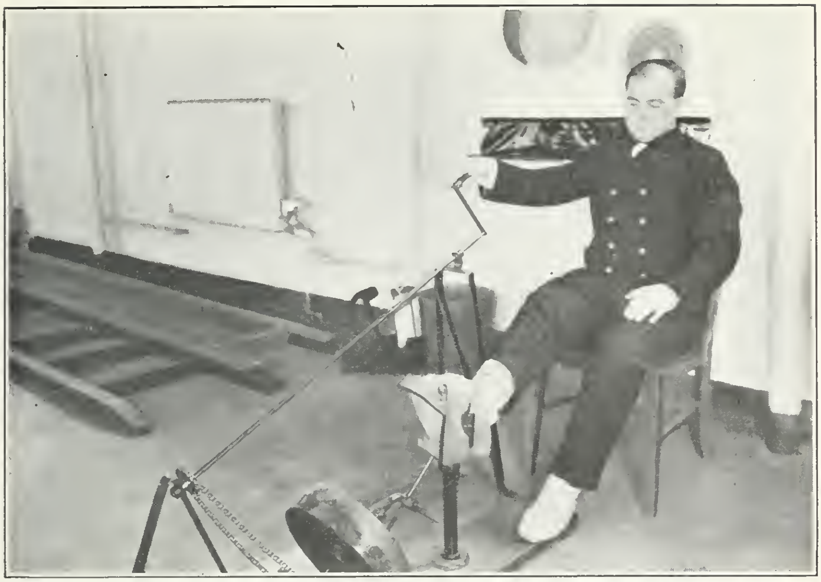

Fig. 53.—Ankle circumduction under patient's control.

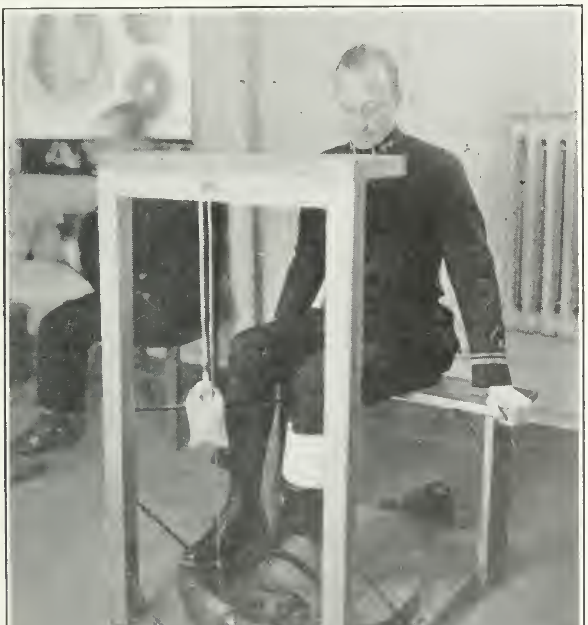

Fig. 54.—Rotation of knee. Abduction and adduction of foot. Note scale and pointer at the foot for measuring movement.

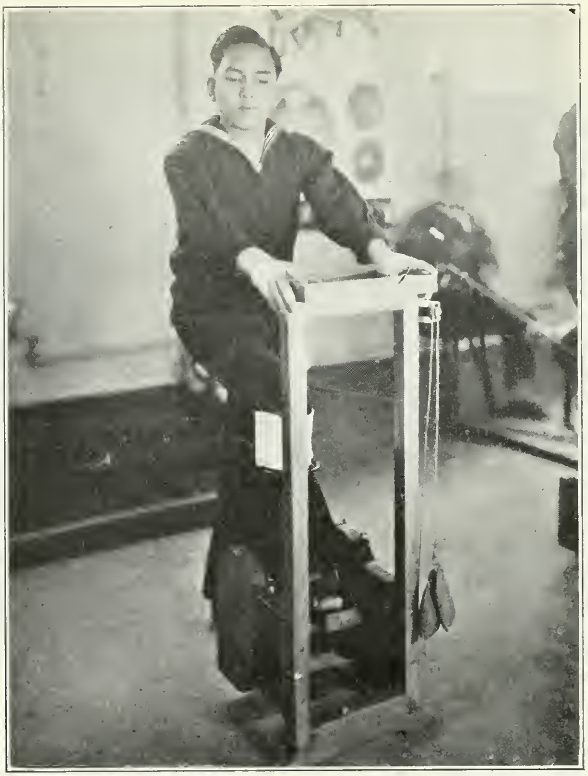

Fig. 55.—Apparatus for foot drop exercise.

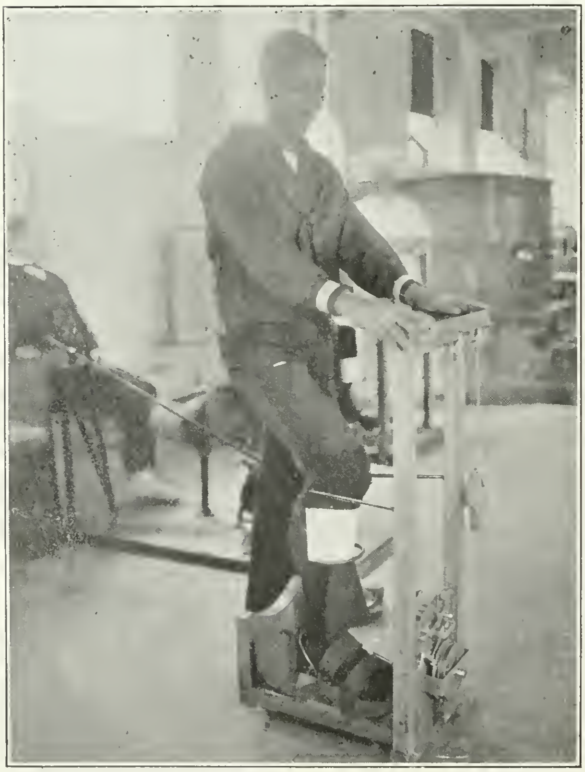

Fig. 56.—Inversion and eversion of ankle.

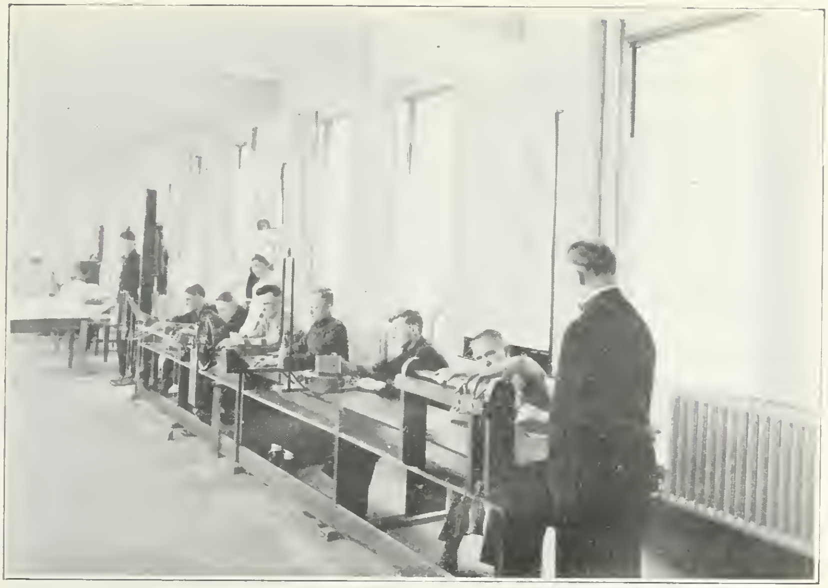

Fig. 57.—Table with apparatus for mechanotherapy of hands and arms.

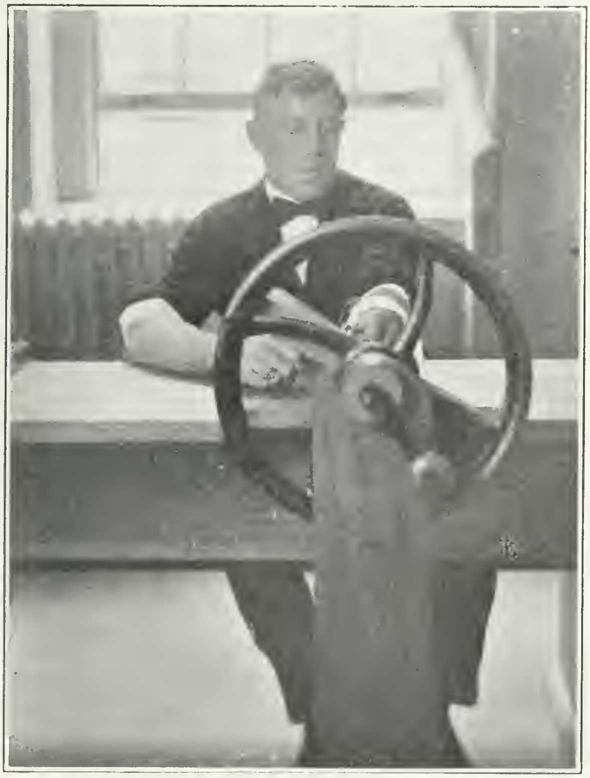

Fig. 58.—Wrist circumductor in use.

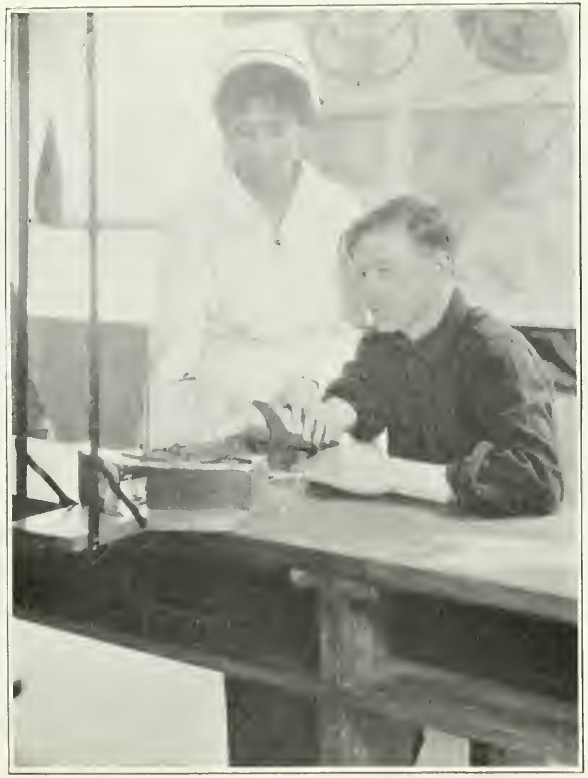

FIG. 59.—Apparatus for flexion and extension of wrist.

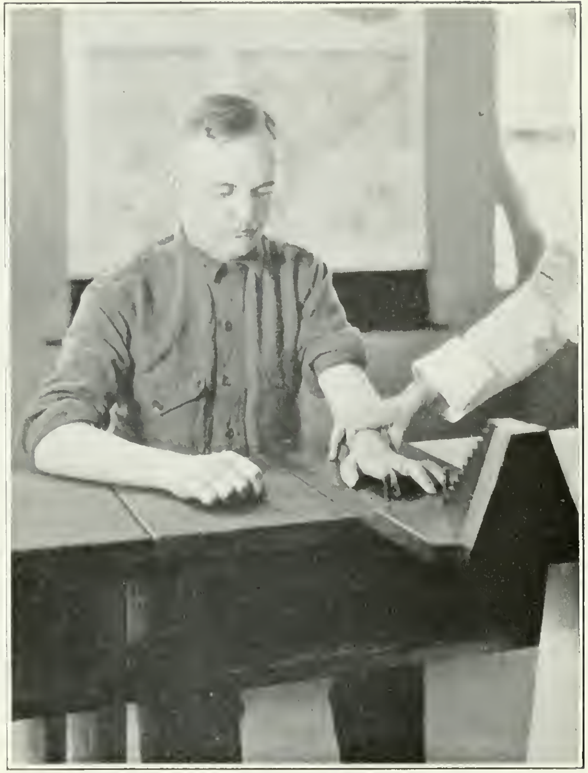

FIG. 60.—Finger board for stretching contractions and finger flexions.

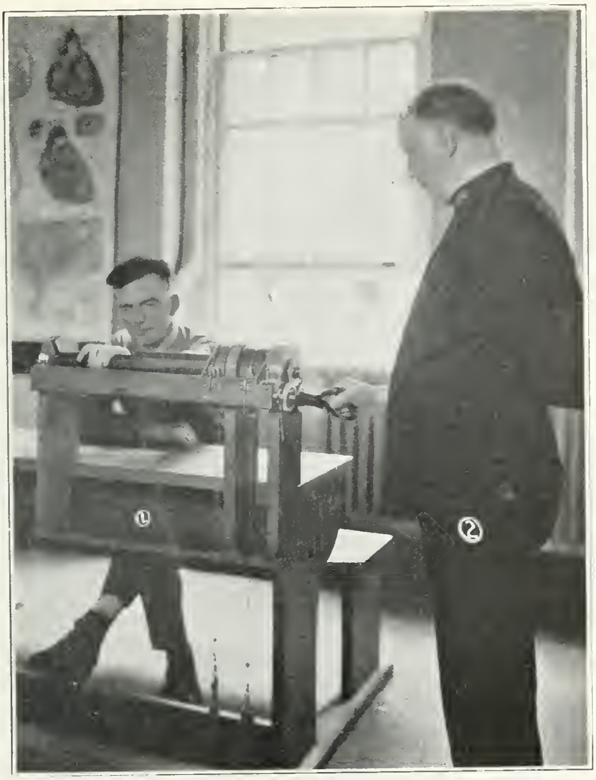

Fig. 61.—(1) Wrist mill for flexion and extension and (2) apparatus for pronation and supination.

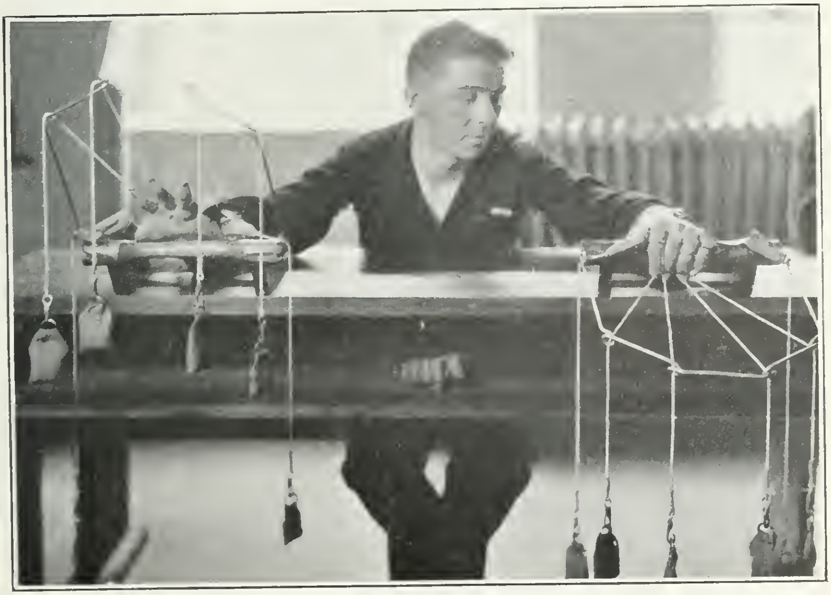

Fig. 62.—Pulley weights for exercising fingers in flexion and extension. The disabled hand coordinating in movement with the normal hand.

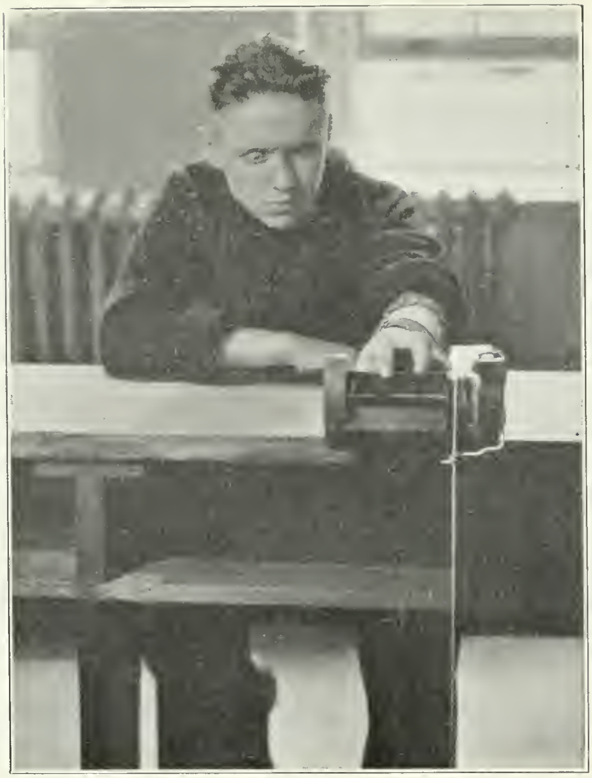

Fig. 63.—Finger exercising

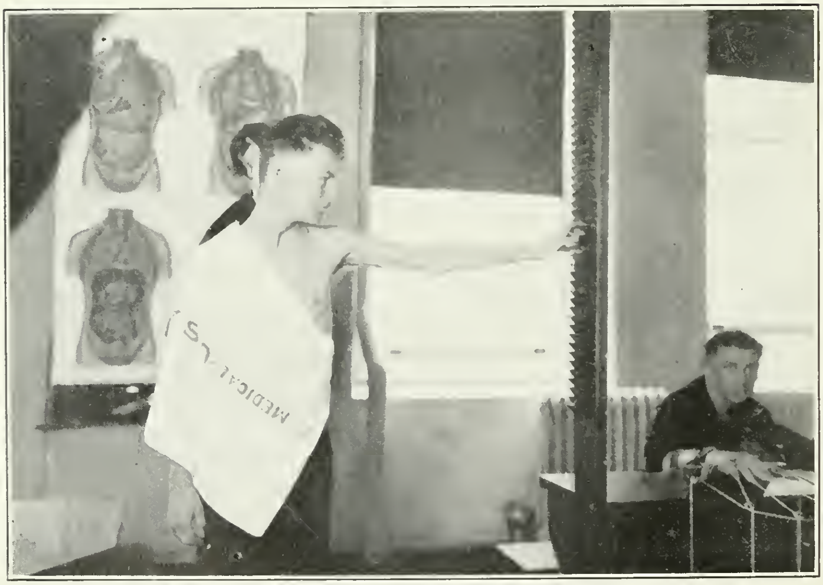

Fig. 64.—Creeping board for shoulder abduction.

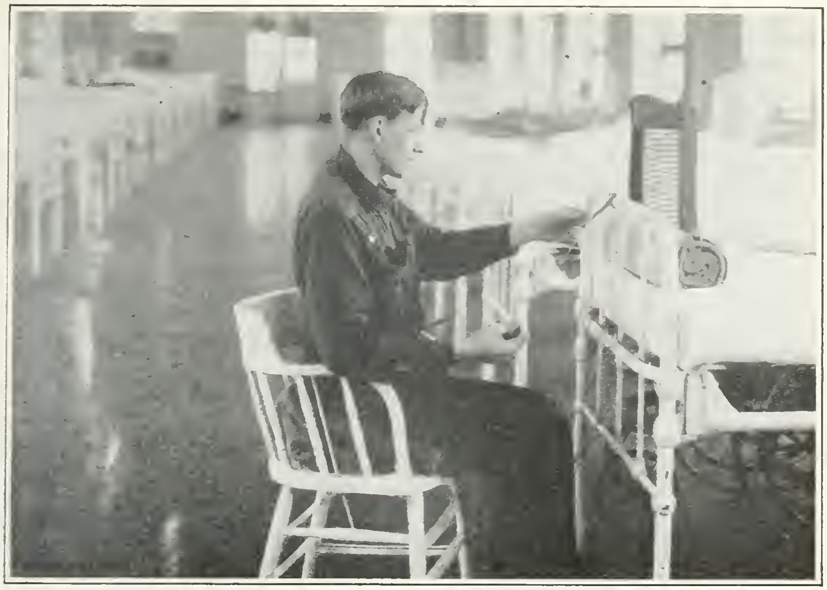

Fig. 65.—Mental case making a belt in the ward.

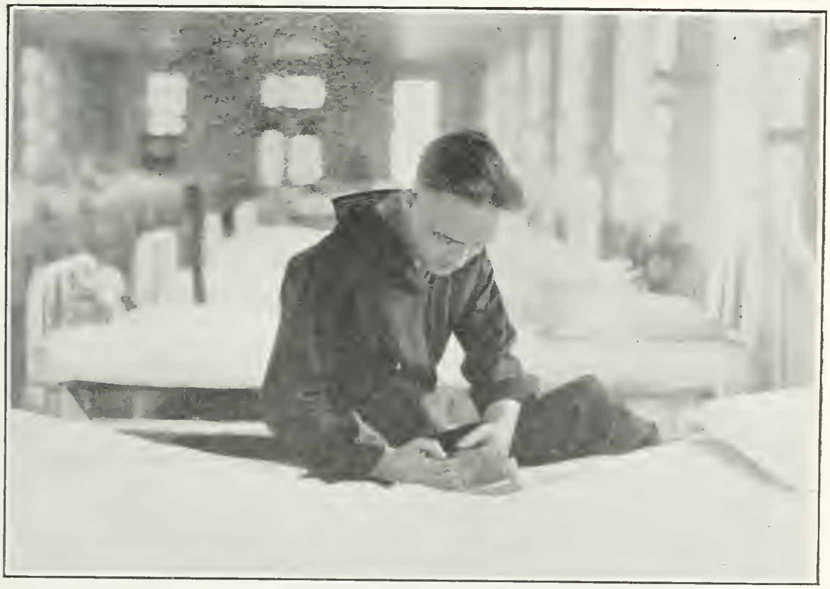

Fig. 66.—Neurological cases are given work to do and many respond to the treatment. Patient making a bead chain.

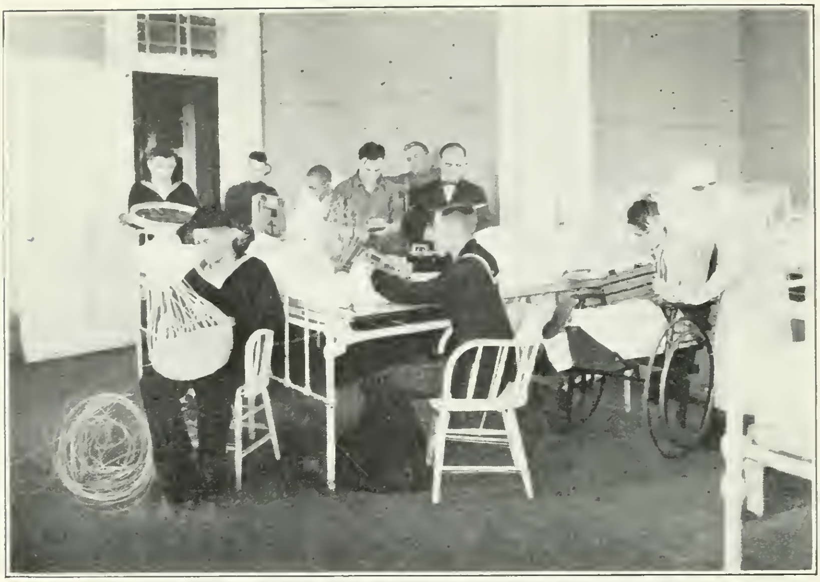

Fig. 67.—Basket weaving and making bead chains in the wards.

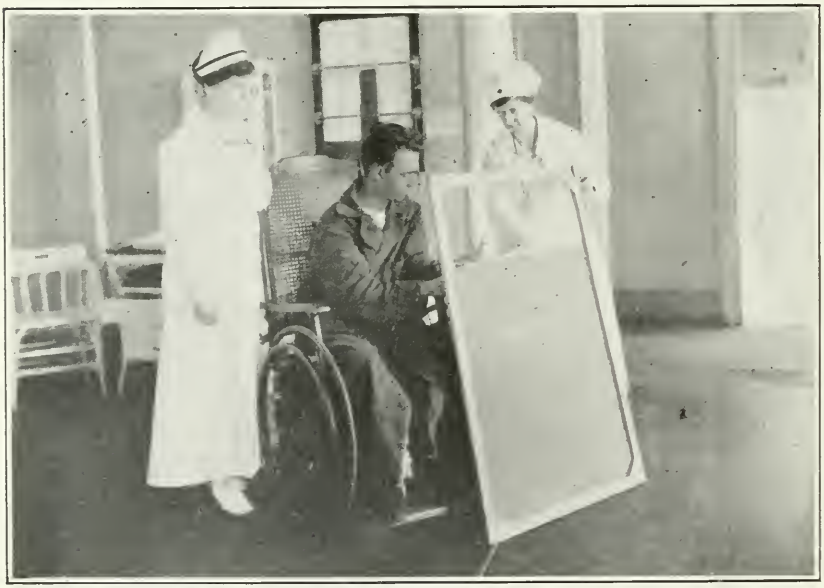

Fig. 68.—Rug weaving in the ward.

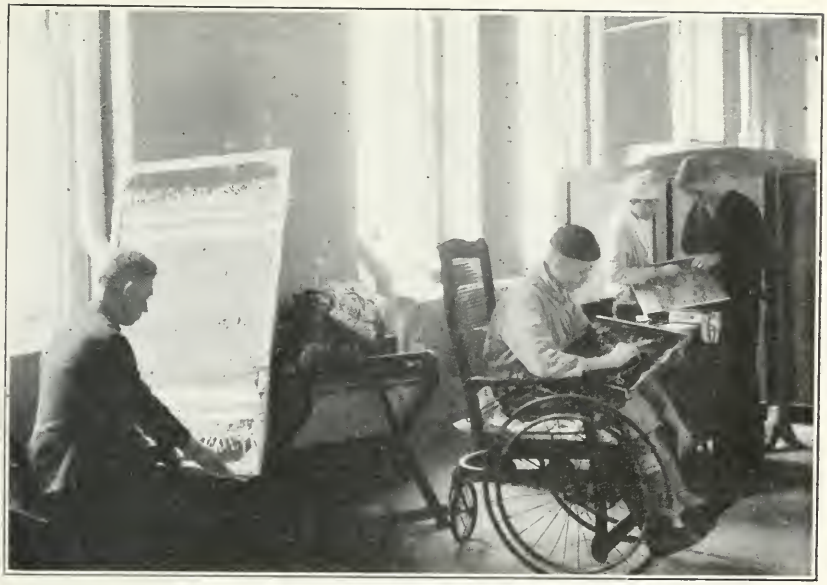

FIG. 69.—Weaving.

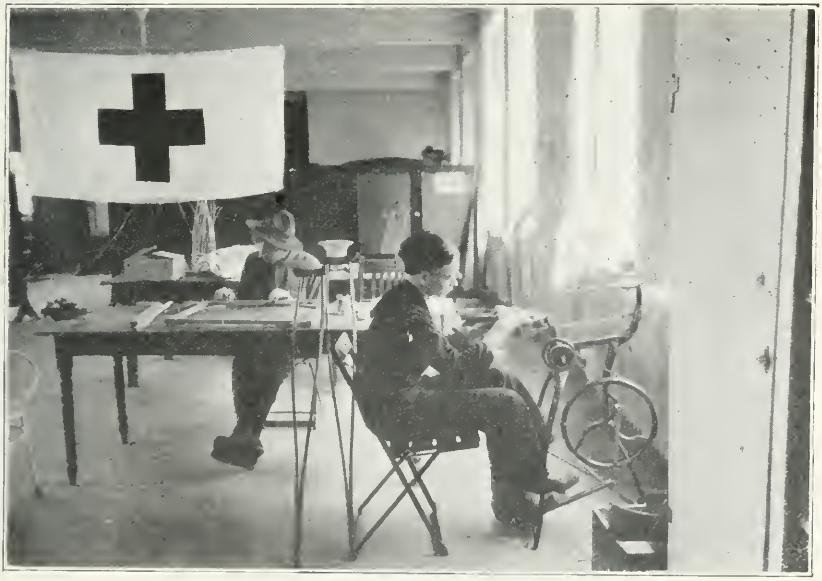

FIG. 70.—Toy making and weaving.

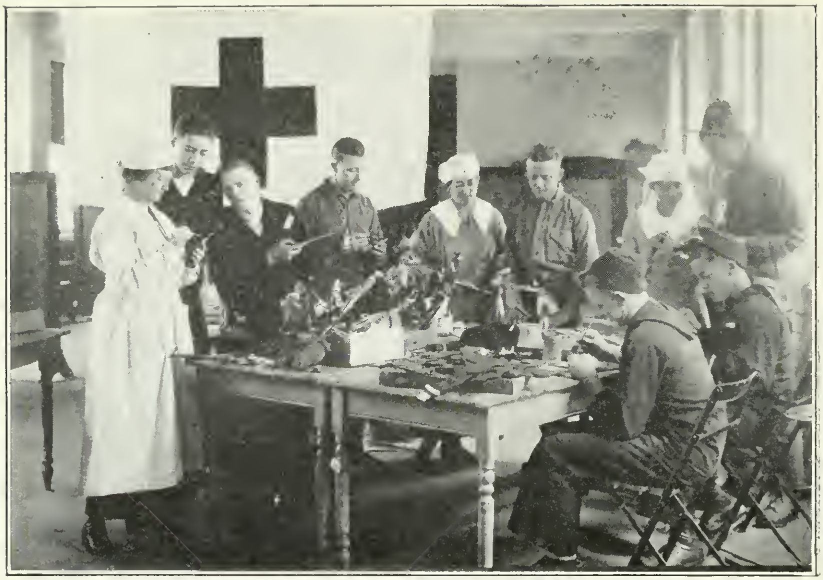

FIG. 71.—Toy making in Red Cross workshop.

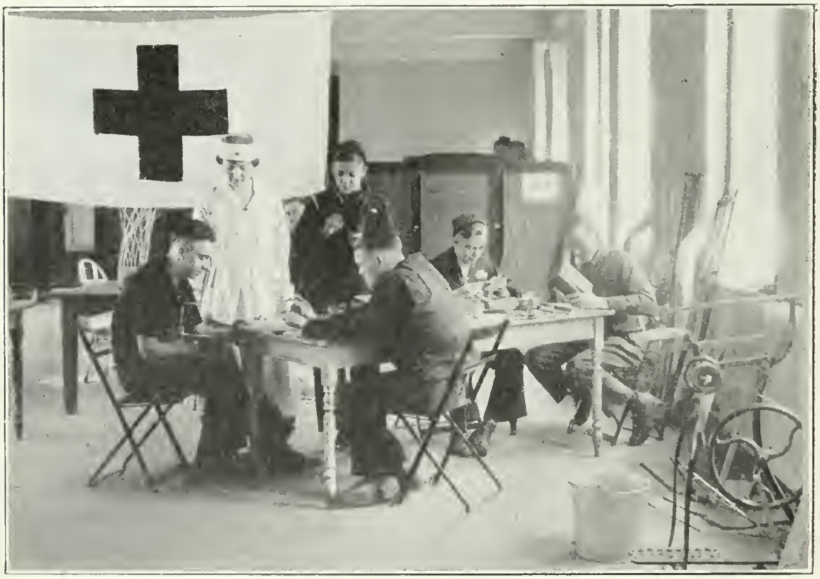

FIG. 72.—Carving; Toy making.

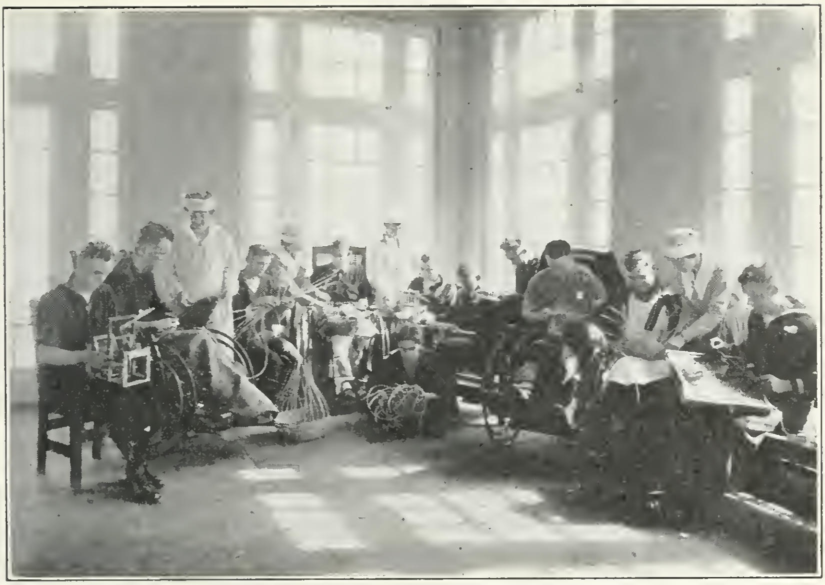

Fig. 73.—Group at work in sun parlor. Sunlight is recognized as a valuable therapeutic agent, and convalescents are placed in the sun as much as possible.

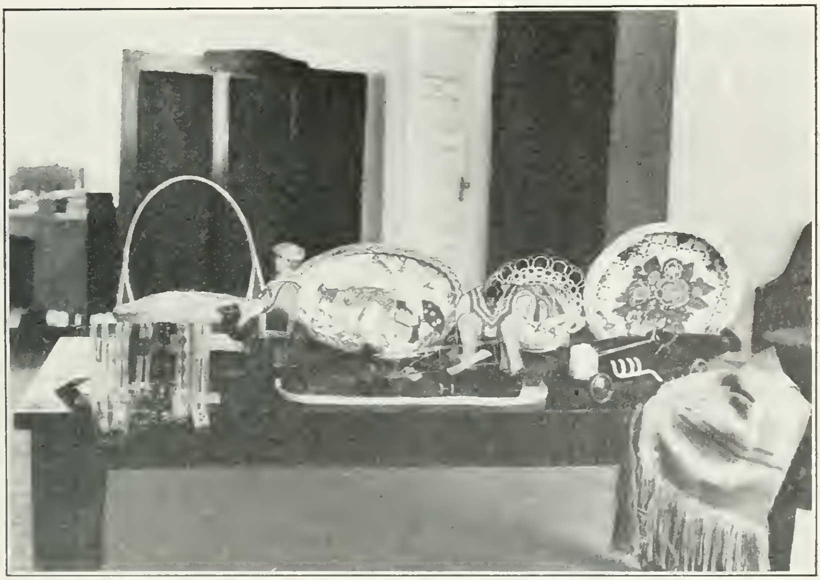

Fig. 74.—Showing some of the work done by the patients. These articles are sold, and the proceeds, minus the cost of the raw material, go to the men who make them.

Fig. 75.—Major J. C. Butts, American Red Cross, and his corps of helpers.

Fig. 76.—Mental diversion—recreation and games.

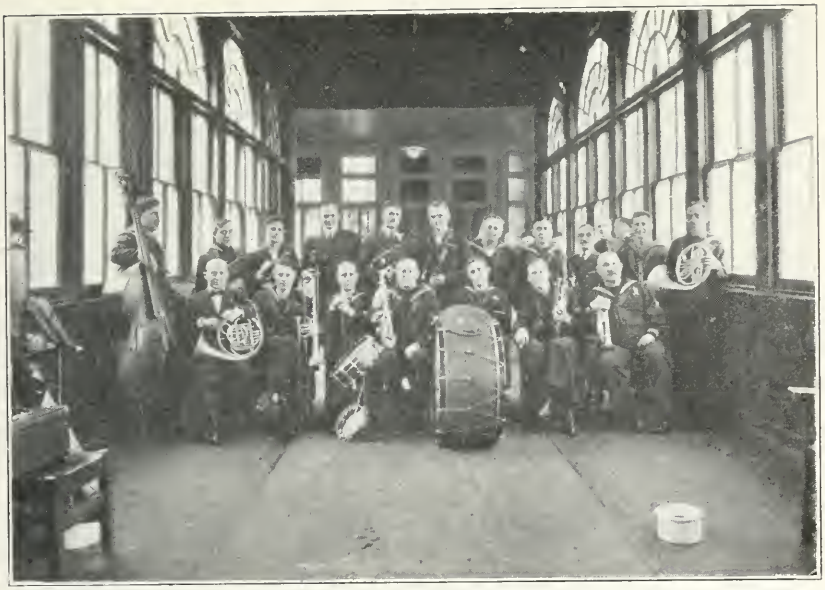

Fig. 77.—Music has been a therapeutic agent since the days of Saul. The band plays in the sun parlor each week.

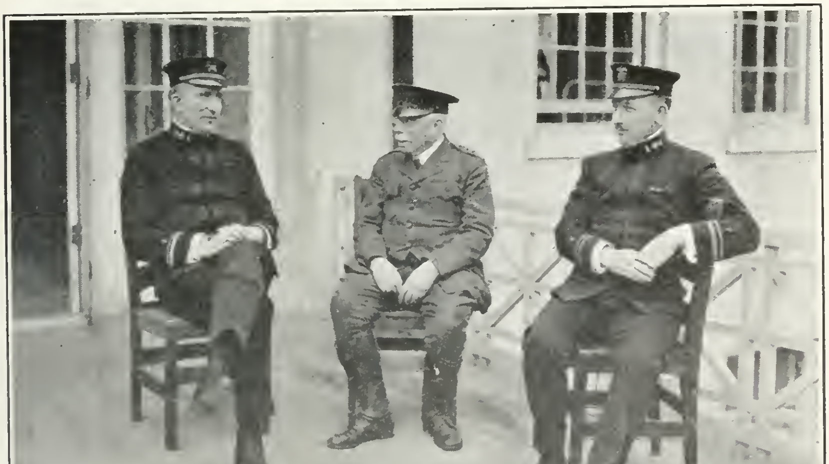

Fig. 78.—"The Lights Divine"—our Chaplains and Welfare worker who have been aptly called an important part of our physiotherapeutic department, bringing cheer and hope and in every way seconding the efforts toward a better morale and a larger outlook.

Linked with physiotherapy, and really an arm of that branch of endeavor, is occupational therapy, which has been highly developed at the U. S. Naval Hospital, New York, N. Y., under the efficient leadership of Maj. J. C. Butts, of the American Red Cross, and his faithful corps of helpers. This work is carried out mainly in the central workshop, where various crafts are taught, but, as Figs. 65, 66, and 67 show, some of it is done in the wards.

Physiotherapy, as carried out at this hospital, represents a group of agents that has definite therapeutic value when rightly applied. In addition, there is a very far-reaching humanitarian and psychological influence. The economic side is in evidence, for the time of hospitalization, in a large number of cases, is materially lessened, and the patient is in better condition to resume his work.

It has been said, recently, that no general hospital, whether in war time or in peace, can function efficiently without having every means at its command toward the prevention and cure of disease, as well as for the treatment of injuries. Surely, the time is coming when every hospital must have within its own walls, or within reach of its patients, the aid which physiotherapy can and will bring.

RECORDS OF THE DEPARTMENT OF PHYSIOTHERAPY

THE records of the Department of Physiotherapy are kept on three separate cards.

The first card, marked "A," is made out by the ward medical officer and accompanies the patient from the ward to the Physiotherapy Department. This card gives the patient's name, rate, to what ward attached, diagnosis, the condition for which physiotherapy is desired and suggestions, if any, for treatment. It is countersigned by the physiotherapy department, returned to the ward to inform the ward medical officer that the patient has reported and again returned to the physiotherapy department, where it is placed on file.

The second card, marked "B," is the history card and is filled out in every case of admission to the department. It contains a history of the patient's injury or disease, the X-ray and laboratory reports and the progress made. This card is for the physiotherapy physician's information and guidance, and is not seen by the patient.

The third card, maked "C," is the treatment card. On this is the patient's name, rate, age, and condition for which physiotherapy is prescribed. In addition is a list of the varieties and modalities used in the department. Each variety of treatment is given a number and each modality under that variety is given a letter. A mark is placed on each card after the modality described. If two or more are prescribed a corresponding number of marks are made, followed by numbers to indicate the sequence desired. The patient presenting himself for treatment takes this third card to the operator, who looks to see what modality has been prescribed, gives the treatment and records it with the date on the back of the card. At the end of the day the cards remaining in the file are of those who have not appeared for treatment. A note is now sent to the ward medical officer giving the names, if any, of the absent patients.

X-ray plates of those patients taking treatment are removed from the X-ray department after being recorded and are kept in the physiotherapy department while the patient is under treatment, where they may be examined as often as may be necessary.

U. S. NAVAL HOSPITAL, NEW YORK, N. Y.
DEPARTMENT OF PHYSIOTHERAPY

Name: Rate: Ward:
Rank:
Date:
Diagnosis:
Condition for which physiotherapy is desired:
Suggestions, if any, as to treatment:

....
Countersigned by Physiotherapeutic Dept.
Signature of Ward Officer.

U. S. NAVAL HOSPITAL, NEW YORK, N. Y.

DEPARTMENT OF PHYSIOTHERAPHY

Name: Rank or rate: Age:
Date of enlistment: Date of admission to hospital:
Date of admission to department: From:
Diagnosis:
Condition for which physiotherapy is prescribed:
History:

....

....

....

U. S. NAVAL HOSPITAL, NEW YORK, N. Y.

DEPARTMENT OF PHYSIOTHERAPY

Name: Rank or rate:
Ward: Age:
Date of admission to department:
Condition for which physiotherapy is prescribed:
Treatment:

1. Mecharo	
	a—Superficial
2. Massage	b—Deep
	a—Active
3. Manipulation	b—Passive
4. Exercises	a—Radiant
5. Baking	b—Non-radiant
6. Radiant light	
	a—Whirlpool
	b—Scotch douche
	c—Sitz
7. Hydro	d—Cabinet
	e—Nauheim
	f—Continuous
	g—Topical applications
	n—Other
8. Vibration	
9. Galvanic	
10. Faradic	
11. Sinusoidal	a—Wave current
	b—Brush
12. Static	c—Sparks
13. High frequency	d—Other
	a—Vacuum electrode
	b—Diathermy
14. X-ray	c—Autocondensation
15. Ultra violet	d—Other
16. Radium	

MORALE IN NAVAL HOSPITALS

By Lieutenant Commander JOEL T. BOONE[1]
Medical Corps, United States Navy

(With eight illustrations)

AS in the case of all wars fought for righteous causes, where man has been benefited by the effects upon nations, great lessons have been learned, great principles established, ideals visualized, and perhaps some realized, but, alas, great omissions recognized. The necessity for preparedness in nations, for eventualities, has been brought home very forcibly in the recent past. Individuals recognize the necessity for personal possession of defensive traits usually too late for application. The American desires not to live other than from day to day, neither looking backward nor forward, measuring neither shortcoming nor indulging in foresight. As it is an individual American trait, it is obviously a national characteristic.

Preparedness to be national must be individual. Extrinsic preparedness in individuals is merely a reflection of an intrinsic condition. The mind, which governs the body, must receive attention first if the body is to be placed in a state of preparedness.

> Condition is to the athlete's body what morale is to the mind. Morale is condition, good morale is good condition of the inner man. It is the state of will in which you can get most from the machinery, deliver blows with the greatest effect, take blows with the least depression, and hold out for the longest time. It is both fighting power and staying power, and strength to resist the mental infection which fear, discouragement, and fatigue bring with them. . . . It is the perpetual ability to come back.[2]

As the World War has taught us the necessity of preparedness, it has impressed upon us that the only way that preparedness can be maintained is by the existence of a very high state of morale, titling it what you will, in individuals making up this great nation. The past has clearly and conclusively demonstrated the necessity for the very highest morale in our armed forces. These are but by-products of the people. To maintain morale at its highest pitch, all efforts must be well systematized and properly, scientifically, and efficiently organized. Morale is nothing new. Morale in armed forces is as old as war itself, undertaken in the past by individual leaders and commanders. Its importance in military organizations is now recognized by congressional action for the carrying on of morale work by the Army and Navy Departments for their respective forces. The trail for definite, systematized, and well-organized morale endeavors was blazed by the American people themselves through a number of welfare organizations. Their wills were expressed in their liberal and generous contributions of themselves and their possessions in the work of maintaining morale at its highest pitch in the troops and seamen who were to stand between them and the enemy. No issue submitted for referendum has received such unqualified endorsement from the American people as the expression of the wish that the individuals comprising the armed forces should be painstakingly and adequately provided for in every way in those considerations affecting their contentment and welfare.

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[1] D. S. C. (U. S. Army), C. de G. (French).

[2] Hocking.

It is proper and well that governmental provision should be the aim, but there must never exist the feeling that only the Government must provide for its own. The Government must always be recognized as the people and not a thing separate, distinct, and apart from the people, and, just so, the Army and Navy are representative forces of the people. The Government providing means the people providing in a compact form. I speak of this for I have been surprised to find so many attempting to make a distinction between the Government and themselves; in fact, seeing no correlation. It is obligatory that during these turbulent times, when governments rise and fall over night, that we have this fact well established within us. It would seem that the people desire to assist in the welfare of their representatives in the services through a civilian institution. This has been made possible by the active association of the American Red Cross with the Army and Navy, by provisions of law, and programs adopted in peace as well as in war. The American Red Cross with its millions of members is the most representative civilian organization chartered for the purpose of rendering aid to the military, as well as the civilian, in times of emergency or distress, and "in matters of voluntary relief, and in accord with the military and naval authorities, as a medium of communication between the people of the United States of America, and their Army and Navy," and through it the American people can assist the constituted governmental authorities in providing for the welfare of those in the military and naval services. The contentment obtained reacts directly upon the efficiency of the service.

In peace or in war the primary effort of morale workers must be directed toward securing the contentment and well-being of the individual soldier or sailor in order that his maximum efficiency may be obtained. It is silly and preposterous to suppose that efforts in behalf of the morale of the soldier or sailor are designed in any sense to pamper him or to give him any but the perfectly legitimate personal attention which will increase his military efficiency.

In time of war the real purpose of morale work is the psychological stimulation of the personnel of the armed forces, so that there will be fully realized the purposes for which the organization, in which they find themselves, exist, and a stimulation of that unfaltering determination to effect a successful and victorious culmination of the undertaking in which these armed forces are engaged.

In time of peace, morale work, it has been said, is two-fold: first, to have the personnel of the Army and Navy in such a receptive frame of mind that psychological stimulation in the event of war will find most fertile soil; and, secondly, to render the Army and Navy as representative as possible of the standards and ideals of the country of which they are the active force. If these agencies are made to be representative of the wills and ideals of the people, greater interest and added pride will be reflected from the people on these services.

Upon whom rests the responsibility for the morale of the Army and Navy? Primarily, on the civilian heads of the Departments of these respective branches of the Government; secondarily, on the military chiefs of the different subdivisions of the Army and Navy; thirdly, on the unit commanders, and, lastly, on each officer and enlisted man. From the highest to the lowest in rank and precedence; from the top to the bottom of a military organization each individual is in some degree responsible for its morale.

As a naval medical officer, one purpose in writing this article is to show in a meagre way what efforts have been made to establish a definite, systematized plan of conducting morale work in naval hospitals during that span between wars, known as "peace." The reasons for carrying on this work should be obvious, if what has been previously stated meets with approval. As an American citizen, I am keenly interested in the morale of both branches of the service and in each department of these services, but, for the purpose of this article, I must confine my interest and remarks to my own service, and, even to a more limited degree, to morale work as conducted in naval hospitals in behalf of the able-bodied and patient personnel. Mere statements of facts or undertakings or accomplishments are of little interest if there is not some reference to the underlying reason and the methods of operation. While my article is relative to hospitals, I feel that what I have to say in many instances is referable to the service at large, for the morale work in hospitals is but the maintenance of a continuity of morale purpose throughout the service. Possibly in hospitals, attention to morale problems must be more exacting than in the service at large, for it is in the former that abnormal minds must be ministered to, weakened bodies stimulated, and handicaps of normal physical activity overcome. Morale work should in a general way follow similar lines to those conducted throughout the service, but there must always be the consciousness that in caring for patients there is a basic distinction due to the mental depressions resultant from illness, helplessness and dependency, and protracted convalescence. Sick men have distorted judgment, reason illogically, magnify trifles, and acquire a certain degree of negativeness. Their spirit of discipline is stunted. They resent correction and restriction. They have ceased for the time to be a part of the team, and, therefore, must be reapplied to a composite group. They must be retaught to think and work in a coöperative fashion. There must be teamwork when they are returned to duty. They must be made receptive to the restrictions of service in a military body. Just as essential as the foregoing is the necessity for treating each patient separately, prescribing for his individualism when he is abed and while still unable to attempt a return to group action. The morale of the patient is just as important as the administration of drugs or surgical relief. In fact, I do not believe it too broad a statement to say more so, for every patient must be treated from a morale standpoint. While some patients need medical, others surgical treatment, a great many need neither medical nor surgical attention but only mental rehabilitation. The last class are not necessarily pathological cases nor psychiatric cases but a peculiar class demanding careful study and definite prescription usually of a re-creational form. (The spelling will be noted—a possible improved method of spelling recreation.)

Patients are fertile soil for influence of good or evil. Morale is not a new problem in hospitals. It is only the term that is new. It cannot be too strongly insisted that morale work has little or no connection with morality save in the degree in which immorality may impair military efficiency. Hospitals have always given special thought and attention to the welfare of patients. Whether the attitude is inborn or acquired by training, the physician and nurse are just as considerate of the contentment and amusement of the patient as they are of his health; for, in fact, they realize that one cannot be separated from the other.

Treatment, if successfully instituted, must embrace rehabilitation of the mind to a like degree that it does the body. A cure cannot be effected by the simple administration of drugs or a stroke of the scalpel. Something just as important, and in many instances more so, is the attention to the mental state of the patient. Prior to return to duty, patients must be in a receptive frame of mind for the tasks they have to meet in an environment of activity and stress.

In considering the question of morale in hospitals, it should be remembered that while the factor of ready and helpful sympathy should always be present, military requirements should not be overlooked. There must be coördination and harmonious blending of the two primary essentials—cheerful sympathy and discipline.

Hospital bulletin boards (this idea was originated for ships) should be among the agents for establishing good will and team work, based upon accurate information, for everlastingly suggesting and teaching discipline and obedience and for building up loyalty.

At the majority of hospitals the bulletin board represents large potential, unrealized value. It is, however, capable of development until it becomes a positive, daily educational influence, a medium for direct communication to the hospital force. Many occasional means are provided for uniting the officers and enlisted personnel with the commanding officer in harmony of thought, action, and interest. These things are good, but they are incidents. Every hospital needs influence rather than incidents.

The value of the bulletin board as a daily influence is limited only by the skill and thought and effort devoted to making it interesting and informative. This is a subject so widely neglected, so little appreciated, so teeming with possibilities of benefit to every hospital that this brief discussion of the subject, it is hoped, will prove of benefit.

The bulletin board is the commanding officer's direct advertising medium to his force. Such publicity is just as important in a hospital as advertising a factory product is to the trade or consumer. This bulletin advertising should, therefore, be managed with the same skill. There are several things that give sales-pulling power to advertising: attractive display; striking, interest-arousing features of information value; humorous, forceful phrases; personality, constant change, and the element of surprise. To make a bulletin system 100 per cent efficient, it should follow the recognized principles of first-class advertising.

Bulletins are of three distinct characters for three distinct purposes:

1. Hospital regulations, rules, and announcements.
2. General education and inspiration.
3. Health publicity, social hygiene, etc.

The bulletin system should embrace all three in such proper balance as best fits the needs of the individual institution.

Why does every educated adult read a newspaper? To know what is going on in his world. The daily spoken or unspoken question on the lips of all humanity every day, year in and year out is "What's new?" "What's new in the news?"

Rule number one is: Make the bulletin board newsy; change the matter every day, if possible; keep out of ruts. Play for the element of surprise and the compelling impulse of human curiosity. Lure the crew into the habit of seeking the bulletins every day regularly. If the officer in charge does not take the trouble to keep the bulletin as interesting and informative as possible, the personnel can not be criticised for almost complete indifference to it.

Of all outstanding, central features of popular attraction for bulletin boards, of all powerful magnets for human attention, none compares in sustained, unflagging, never-failing interest, with large new photographs.

The best newspapers in America have nearly all adopted handsome news photographic Sunday supplements. These are so universally popular and so thoroughly read that the advertising rates in these picture supplements are from two-and-a-half to four times as high as the paper's ordinary advertising space. To give hospital bulletin boards 100 per cent efficiency and drawing power, post large news photographs on or next them. This gives announcements, what advertising men call "preferred position." Pictures and bulletin material should be changed daily.

Rule number two is: Do not crowd the bulletin board. One, two or three quickly-read bulletins, changed every day, are far more effective than crowded boards. Follow the precept: "Be brief, that he who runs may read." No bulletin board should contain more matter than an average worker can read, comprehend, and digest in two to four minutes. What is lost in quantity is always gained in display value and sticking quality. Follow billboard publicity methods; use as little type matter as possible, telling your story in pictures or diagrams whenever you can. Eighty-five per cent of all humanity is "eye minded" and does not easily visualize printed words.

Rule number three is: Prepare and select your bulletins as much as possible from the "Do" angle rather than from the "Do not." Positive statements get further than negatives. Many hospitals' regulations and publicity are necessarily of the "Do not" variety. See that posters and bulletins are linked with a positive stimulus whenever possible. Useful publicity rises to its highest when it makes men think constructively—when it develops the habit of forethought rather than fear. You can not teach men discipline and obedience entirely by scaring them. They will quit the job, if it becomes too uncomfortable. Faith is always better than fear.

Rule number four is: Put a proper amount of humor and red-blooded virility into the bulletin board. Make it good, man-to-man talk that exudes personality and humanity, and a recognition of the man inside the blue shirt. Coldly impersonal and anemic communications should not be issued from a well-disposed, cordial commanding officer to a body of men whose good will he is trying to secure and preserve. Make every printed word live and speak in the same spirit in which you would personally address a group of men. Put punch, pep, and personality into the bulletin board. Signs, for example, that merely say "Safety first" will no more inculcate the habit of forethought and careful conduct in a body of workers than a business card alone will sell goods.

Rule number five is: Take the personnel into your confidence through the bulletin board. Make them know their hospital, their commanding officer, and their immediate officers. Post bulletins that will tell about the Navy, new orders, words of commendation. Tell the personnel when they have done well. Educate them to a sense of real participation in the achievements of the hospital.

Here is a superb opportunity for the commanding or executive officer who has the real human touch, who understands the psychology of labor, who has studied the philosophy of modern industrial relations, who is sincere in his desire to "get next" to his personnel, who is imbued with a sense of his responsibility, who knows the mental and spiritual needs of the personnel, who properly appraises "man-building" as a basis for organization, who correctly estimates the potency of good will as an element of naval efficiency. Make the bulletin board a mirror that will reflect the sunlight of understanding into the darkest corners of hospital ignorance and possible hostility.

Education, service, and welfare always pay big dividends, if skilfully conducted. The hospital bulletin board is another such big opportunity at most hospitals. The cost of making bulletins 100 per cent efficient is very, very small. The direct benefits measured in closer understanding, health conservation, better teamwork, and greater good will, will pay at least 100 to 1 dividends on all the time invested in this work.

The matter to be posted in bulletin boards is too important to be left to a mediocre subordinate. It is a chance for a man with real ability, a big opportunity for a large calibre, brainy man to make his personality permeate the very life, thought and spirit of a hospital force. The expected results will be in exact proportion to the skill and ability of the man to whom this opportunity is entrusted.

Commanding officers of hospitals have always endeavored to some extent, no doubt, to provide entertainment for those under their command in whatever manner was available locally and with whatever facilities were to be found in their particular surroundings, accepting charitable services from civilians manifesting local pride in naval institutions, or using what funds could be procured from the various enlisted men's clubs, contributions from officer personnel, and the like. The character of the entertainment and the amount varied at different institutions, depending upon the interest manifested by the commanding officer and the facilities and funds available. Now, morale should never be trusted to chance for the reason that everything affects morale through suggestion. Morale effort must be directed through definite channels and founded on sound and scientific principles by means of which it can be made a factor of greatest importance.

Not desiring here to discuss what has been accomplished by the great welfare organizations during the war, I want to show how the morale work in hospitals is conducted by the Navy itself, assisted by the American Red Cross. With the establishment of the Sixth or Morale Division in the Bureau of Navigation, and the taking over of the activities conducted by various welfare organizations during the war for the purpose of continuing under its own administration the splendid welfare services originated and carried on by these organizations, means were studied to ascertain the most efficient method of applying this naval welfare service to our hospitals. Gradually what seems the most adaptable method has been applied. All morale work in hospitals and other establishments coming under the cognizance of the Bureau of Medicine and Surgery, Navy Department, is coördinated by the writer who, as an assistant in the office of the Surgeon General, was assigned as liaison officer between the Sixth Division, Bureau of Navigation and the Bureau of Medicine and Surgery. As I had previously been detailed to National Headquarters, American Red Cross as the Director, Bureau of Naval Affairs, in accordance with a provision of law, and as the personal representative of the Surgeon General, who is the representative of the Navy Department on the National Executive

Committee at those Headquarters, it was felt that this detail would accomplish most effectively the desired results. A definite peacetime program having been agreed to between the Navy Department and the American Red Cross, which program, with the exception of that helpful aid rendered to the enlisted personnel of the Navy in conformity with the wishes of commanding officers, and that aid rendered to the families of its vast personnel, known during the war as "Home Service" comprised activities confined, for the most part, to the sick, injured, and convalescent, all Red Cross association with the Navy should be coördinated by the Director, Bureau of Naval Affairs. The wisdom of having the one individual who coördinates all Red Cross activities in or with the Navy the same individual who coördinates welfare activities in hospitals with the Morale Division, Bureau of Navigation, is perfectly obvious. Simplification of procedure saves time, conserves personnel, and adds to efficiency.

Instead of commanding officers of hospitals working independently, displaying more or less interest in questions of morale, as they see fit, and necessitating their procuring material for morale work in any manner open to them locally or by any methods their wits might devise for meeting the situation, the establishment of a desk in the office of the Surgeon General for morale work, has definitely organized this work under his direct supervision. A beginning has been made. Perfection of administration can only come with time and experience. Coöperation and willing and generous assistance from each commanding officer can only make that kind of administration possible. As the definite establishment of morale is new, suggestions are solicited, and the most adaptable for application will react beneficially on the entire service. Only to a degree should hospitals act independently. It is most desirable that hospitals provide for themselves in accordance with local needs and with respect to local environments. It would be absurd for a central office to lay out a morale program for all hospitals. Only policies should be adhered to. Advantage must be taken of community coöperation and assistance. It is desirable that efforts be made to stimulate community interest in local naval hospitals. The pride manifested by communities in these institutions is most advantageous to the Navy. The naval hospital which inspires pride and admiration is a decided local beneficial influence.

A commanding officer is responsible for the morale of his institution. Authority may be delegated but responsibility remains his own. Most commanding officers are alive to the significance of this responsibility. I have visited every naval hospital in the United States. First impressions are usually lasting. We know considerable of the spirit of a man when we first meet him, if we are keen observers; likewise, the spirit of an institution greets the stranger at the threshold. No amount of veneer or polish can hide the surface beneath. It stands out boldly and distinctly. No amount of apology can conceal it. The spirit of the hospital is dependent upon the attention given to the morale. That attention must be directed to the commanding officer himself, his commissioned staff, his nurses, his enlisted personnel, his patients, his civilian force—everyone about him. As long as there are any omissions, neglect will be evident in a dissatisfied spirit affecting, possibly minutely but adversely, the spirit of the institution as a whole.

I fear sometimes that we think only of the morale of the enlisted man. We must be cognizant of the necessity for providing for the officers' morale as well. The nurse, of course, should never be overlooked. To repeat, we cannot afford to neglect anyone. Morale means in a great measure contentment. That which provides contentment is a morale factor. We are too apt to say things can not be, because they are prohibited by regulations. Possibly our ignorance of interpreting regulations correctly accounts for some so called "impossibles." There is always resort to approval or disapproval by higher authority. Most generous interpretations are made of regulations and laws when the object sought is for the contentment and well being of individuals. New laws and regulations are constantly being made. The simplest suggestion may mean immeasurable benefit to the service. I have upon several occasions found commanding officers conscious of certain benefits to their personnel but considering them not in the range of possibility of obtainment have failed to take steps to procure them, when as a matter of fact they could have been obtained and meant much in happiness and contentment.

Each hospital should have an Aide for Morale to coördinate all morale efforts locally under the commanding officer's direction but such assignment cannot relieve the commanding officer of responsibility for he should appreciate that he himself is the Morale Officer. Individuals must be known and their point of view given attention. There must be sympathy when troubles arise. If the Navy is to provide for morale itself it must be approachable and encourage personal contact. The man in the service should be taught that the commanding officer is his most helpful friend and that it is to him that he should go when needing any assistance in personal as well as military difficulties. As a whole, the service has not as yet made that possible; consequently, outside aid is sought and outside assistance rendered. No one should be able to take the commanding officer's place where personal contact is essential. In making assignments of medical officers as Aides for Morale at each hospital, careful selection should be made; for the type of service rendered depends to a great extent upon the individual directly in charge and the support of this service is frequently withheld because the character of the individuals directing it are wanting in admirable service reputation. The good of the undertaking is masked by the low estimate placed upon its champions. The assignment of medical officers as Aides for Morale at hospitals will stimulate greater interest in welfare activities among officers and enlisted men, and will properly coördinate the work locally under the direction of the commanding officer, besides being one of the means of training medical officers in principles of leadership. A younger officer is likely to be selected for this particular assignment, and it is well that medical officers coming into the service should early be impressed with the importance of attention to other than the purely professional side of their naval position. Too much attention cannot be placed upon the necessity of the possession of qualities of leadership in the medical corps, as well as in other branches of the service. A naval medical officer must be a very broad, many-sided individual, alive to every phase of his naval environment. These Aides for Morale must appreciate the necessity for possessing the qualities of leadership. Certain facts are stated below which should be helpful in acquiring those qualities. These suggestions have been read but the original source not known.

Many officers believe that the art of handling men involves nothing more than the "know how" and the authority to give orders. Others will tell you that the faculty of leadership cannot be acquired and that a leader of men is born, not made. They might as well say that one cannot become a good musician unless born with an ear for music. As a matter of fact comparatively few of those having an ear for music become good musicians. They can pick up tunes so easily that they are unwilling to study and practice and the result is that they are usually outdone by the more ambitious ones who have to work hard to get their skill and who therefore appreciate the value of it. The war with Germany has proved that a man can develop himself to a remarkable degree within a very short space of time if he goes at the task in the right way. At the aviation schools, for example, they take a young man who has never seen an aeroplane, never drawn a map, never taken a photograph, never fired a machine gun nor sent a wireless message, and within a few months they turn out an expert flyer who is equally at home in the air right side up, or up side down, who can do the spiral glide, falling leaf, loop the loop, tail spin or nose spin; who can photograph the enemy's lines, draw maps of what he has seen, send wireless messages, make bull's eye with machine-gun fire; and who, if his machine becomes damaged, knows every part of it so thoroughly that he can repair it if it is repairable. This young man becomes an expert flying fighter because his daily thought is to develop one by one those qualities which make the expert in this line. In the Navy we find that those who have advanced in the art of handling men have not, as a rule, been born with magnetic or hypnotic powers, nor with peculiar gifts or persuasion, but have cultivated this power of leadership by following certain definite principles. In most cases it has taken them a great many years to find out what these principles were, because there have been few books to tell them and they themselves have not been able to record their experience in words for the benefit of others. In the old days there were officers who believed that unlimited authority and a stock of profane words, coupled with the ability to use them, was all that was necessary to get work out of men. Such an officer was not a leader at all but a driver, and the reason that the men did not desert was because jobs were scarce on the outside. The days when this kind of an officer was successful are gone and will never come back. Nowadays it is next to impossible for an officer to know more about every detail of his profession than any of the officers or men under him. The business of the modern officer is to make use of the knowledge of others. He is not expected to be a specialist, but must know how to make specialists of other men. It is well to get the habit of welcoming responsibility. At the start this can be done by looking for the hard jobs that others avoid. Any man who really gets in the habit of "eating up" work that others like to shirk is going to find it easy to climb the ladder of success.

Life in hospitals as aboard ship is full of unexpected happenings, some of them real emergencies, when a leader of men is called upon to make a quick decision and act at once. The only way to get this ability is to cultivate the power of making accurate decisions. Like all the other necessary qualities, it can be cultivated systematically. The majority of men go through life taking most things for granted. If they have an opinion on any subject it is because they have read it in the paper or have heard it from someone else. When you face a man of this kind with a situation that he has not met before he is at a loss in making up his mind what to do. When he does act, if at all, it is mostly the result of a guess and is as likely to be the wrong move as the right one. The ability to make quick and accurate decisions in emergencies is gained through the habit of making accurate decisions about less important matters. There is no short cut in this matter. The habit of asking yourself "why" is commendable. This is the word that nature puts most often into the child's mouth, for the very good reason that one learns more quickly through asking it than in any other way. The trouble with most people is that they stop asking this question after they are nine or ten years old. If everyone kept up the "why" habit into maturity there would be a lot more reasoning ability than there is now.

There are no set rules for being tactful. With one man it means coming out strongly with a positive statement, while in dealing with another it means making suggestions and letting him think that the idea comes from him. The most practical rule is to take one man at a time and to make a careful study of that man. That is the whole thing in a nutshell—the study of human nature. It is necessary to see what is aimed at before one can shoot accurately; and the strong and weak points of a man with whom you are in dealing must be known before the easiest and surest way to influence him can be determined. Many officers may say it is not necessary to go to all this trouble to handle men, when you are in authority over them and have the backing of the Navy regulations. The man who says this, is wrong. Nobody gets very far in this world on somebody else's authority. Pick out the officer who has made the most marked success and it will be found that it is the influence of this officer himself far more than the influence of the Navy regulations back of him that has enabled him to obtain these results. An officer of this type is successful because he knows men, and in order to know them he has had to study them. Knowing men is not merely being acquainted with them, but it is knowing just how they think and how they will react to any statement or suggestion. An officer sometimes says "I am only a cog in the wheel." What sort of future can such an officer expect? He has not enough originality and push, not enough ambition and self-respect, to direct other men. He cannot see beyond the mechanical side of his job, and so he can express it only in mechanical terms. The cog-wheel attitude is wrong. Compare it with the idea represented by the team. A member of the team is not a lifeless machine part. To be sure he must follow instructions, he must obey rules, he must work towards a definite goal. But he is an individual, with brains and hands capable of development, with opportunities to increase his producing power. The cog can never aspire to larger responsibility; the team member can. In fact, if he shows ability, it is almost a certainty that he will be promoted. The team idea is the winning idea. Without this attitude it is impossible to understand modern hospitals. With it one can go as high as his ambition and energy and persistence will carry him. It is the starting point for all advancement.

The expense of welfare work is considerable and it would appear that expense will not decrease with proper application of this work but quite the contrary should be expected. In time as the service is educated to what should be a well balanced amount of welfare activity, the financing of this activity will be more efficiently conducted. Considerable attention has been devoted to the proper handling of funds in hospitals. Slush funds are a direct violation of law and Navy regulations. Commanding officers are not bonded officers and are prohibited from handling funds. Their duly accredited representatives of the supply corps are the only officials authorized to collect and disburse money. The establishment and operation of ships' store at shore stations having been authorized, profits derived from the sale of only such articles as are usually sold in ships' stores aboard ship are available locally for the amusement, entertainment and contentment of the enlisted personnel. Most naval hospitals are now operating ships' store for the convenience of the hospital personnel devoting the profits for the above stated purpose. This should be the chief source of revenue for welfare purposes. It is essential that hospitals make every effort to establish and maintain these stores for it would appear that eventually they will constitute practically the only source of financial assistance for carrying on welfare activities. Funds have been so easily obtained during the war that some commanding officers do not yet appreciate the significance of the need for operating these stores on the most extensive basis consistent with Navy regulations. Every hospital should have a ships' store and the commanding officer should give it every attention and encouragement. Neglect will mean a hospital with poor spirit, eventuating in an inefficient institution reacting of necessity to his discredit.

Congress has generously appropriated for conducting morale work for the present fiscal year. The Bureau of Navigation, Sixth Division, is charged with the administration of this appropriation. Hospitals have been allotted fixed sums. The smaller hospitals with little or no local facilities for deriving funds have been more liberally treated than the larger ones. The foreign station hospital and the hospital ships have not been overlooked in as generous provision as was possible. Heretofore recreational and athletic materials could be requisitioned from the Bureau of Medicine and Surgery, the Bureau of Navigation or the Bureau of Supplies and Accounts, but now commanding officers have funds available with which they themselves must procure what is desired. Moving picture service is procurable through the Navy Moving Picture Exchange. Hospitals are charged a stipulated sum for rentals of pictures now that each hospital is given an allotment. Prior to the existence of these available funds, hospitals without ships' store profits were given moving picture service gratuitously. The fund provided by the Sixth Division is merely supplementary to what a hospital is expected to have for it is felt that hospitals must aim to be to a large extent financially self-supporting from ships' store profits. The Morale Division of the Bureau of Navigation is rendering a splendid service to the entire Navy. Too little is known of its activities, but results and effects upon the service generally will react to the credit of this Division. Its one aim is to maintain morale at its highest pitch by providing for the spirit of contentment within the service.

The American Red Cross is continuing in peace certain activities rendered the hospitals in war. Home Service, mentioned heretofore, is carried on at hospitals in a similar fashion to that used for the Navy at large. In addition, the Red Cross acts as a supplemental agency in providing entertainment, amusement and recreational features at our hospitals; distributes minor supplies for the comfort and welfare of patient and furnishes hospital supplies when required in an emergency as was done during the influenza epidemic in 1918.

To conduct these activities Red Cross representatives are stationed at the larger hospitals. The work at some hospitals is so extensive that it has been found necessary by the Red Cross to assign more than one representative, in fact a few hospitals have quite a Red Cross staff. The one in charge locally of the Red Cross activities under the commanding officers' supervision is known as the Field Director. These Red Cross workers are a group of splendid, refined American men and women actuated in their endeavors by the highest patriotic motives. Their accomplishments cannot be measured nor their labors entirely defined. What they do is as hard to define as morale itself. A great deal is specifically outlined but their little ministrations to the enlisted personnel, might be considered inconsequential when casually considered, but actually they are of inestimable value to the happiness and contentment of the man in the service. Much of their effort, like morale, is intangible. Electricity is intangible but behold its effect!

For a time a great part of hospital recreational and entertainment activities was provided and conducted by the Red Cross. Gradually these activities have been taken over by the Navy itself but there has been no attempt to interfere with hospital welfare programs other than to work towards government supply. Of course it is really needless to say that a certain amount of curtailment is necessary when permanency and more restricted funds are considerations of the foremost importance. War recreational measures cannot be used as a standard or index. Practically all hospitals have made attempts to have a well balanced recreational and entertainment program. It usually comprises activities enjoyed in the open and in convalescent houses or recreational centers. For the outdoor and indoor forms every class of personnel should be encouraged to take part whether as actual participants or spectators. It is more preferable that in one form or another all should be participants. There should be arranged sufficient variety to appeal to each individual. This does not mean that all the personnel need to literally join hands and play together. It means that all the personnel should be stimulated to some form of recreational activity. Athletics are the principal outdoor entertainment activities. Patients can indulge but to a very limited extent in athletics, but as spectators much amusement is derived. Theatricals, vaudeville and moving pictures should be carefully selected. Variety is essential. Three entertainments a week seems sufficient. Except at an isolated hospital like Fort Lyon, Colorado, whose patients are all tubercular, more than three entertainments seem superfluous. Moving pictures are not necessary at each occasion. Where entertainments and movies are too frequent, proper interest is lacking and the "shows" become commonplace. Besides it is desirable that the quality much more than the quantity of entertainments be the aim. The presence of the commanding officer and members of his staff with their families enlivens interest in these entertainments. At one hospital, amateur dramatics have been very popular and have done much for the morale of the hospital. The dramatic club is composed of officers, female members of their families and the enlisted personnel. The commanding officer took an active part himself in most of the entertainments provided by this club. His personal interest in all problems affecting the morale of his command, was evident in the smartness of his hospital.

Occupational therapy, which seems really deserving of the more appropriate designation occupational recreation or recreational occupation, has been conducted at a few of our hospitals with very gratifying and beneficial results to hospital and patients. Both bed and up-and-about patients enjoy this form of diversion. The long hours in bed are less irksome when the patient has something to occupy his mind, particularly when he can measure his accomplishments. This recreational feature has been conducted by the Red Cross under the direction of the commanding officer. Materials are bought by the Red Cross for the articles that are to be made, the individual patient paying for the materials at actual cost, and, when made, the article is disposed of by him, either as a gift or through sale. The purpose is to stimulate interest, initiative and activity in the patient's mind, to assist in the restoration of physical function, and to amuse. This form of diversion creates opportunities for encouraging the patient; rouses in him a pride in his ability to originate so that he will put not alone his hands but his individual personality into his work. Nothing is more detrimental to the health in most classes of patients than to lie in bed with only their passing thoughts and reflections occupying their minds. When such condition is permitted, neurasthenia complicates the initial condition and frequently persists long after the original ailment has been cured. The hospitals which have applied occupational therapy are very enthusiastic as to the results attained. Of course, bed patients are limited to the form of this recreation in which they are able to indulge, but as soon as they are in wheel chairs or walking about, access is had to a room or shop set aside as a work room for this purpose. Among the various articles made are baskets, toys, mats, rugs, pillow covers, shawls, belts, beading, also painting, framing, wood carving, etc. The patient is permitted

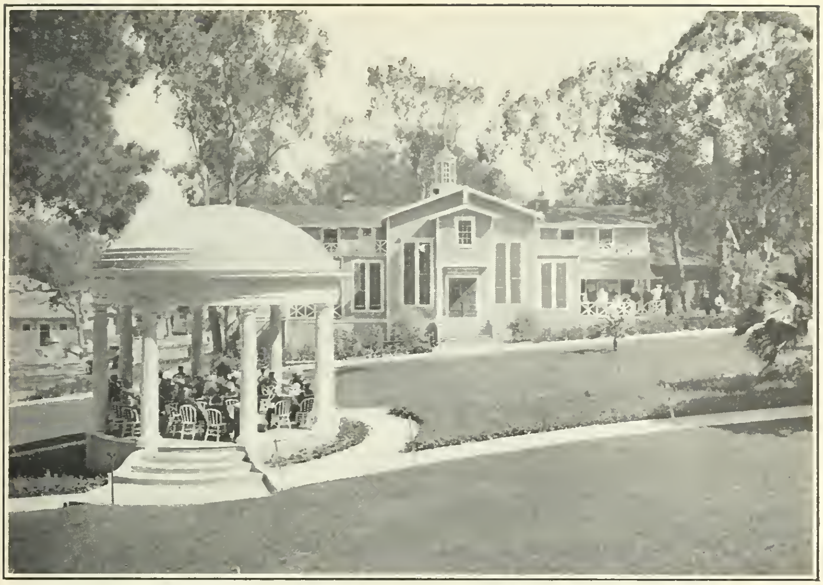

Fig. 1.—Convalescent House, U. S. Naval Hospital, Mare Island Calif.

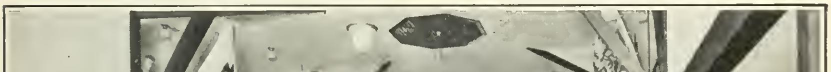

Fig. 2.—Interior Convalescent House, U. S. Naval Hospital, Mare Island, Calif.

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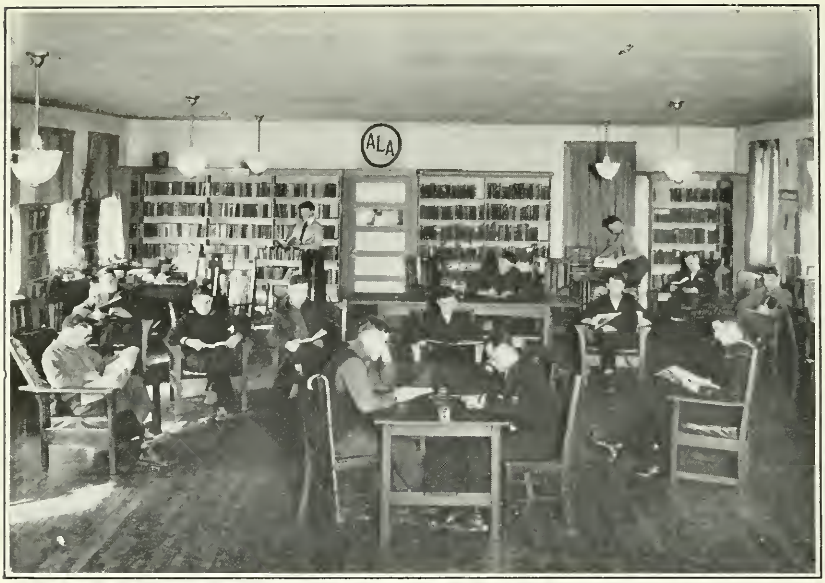

Fig. 3.—Library, U. S. Naval Hospital, League Island, Phila., Pa.

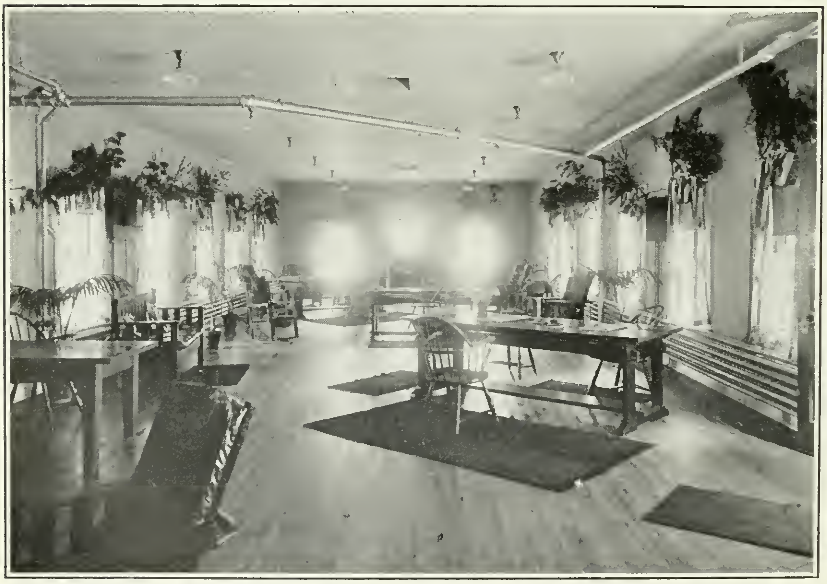

Fig. 4.—Recreational Center, U. S. Naval Hospital, Portsmouth, N. H.

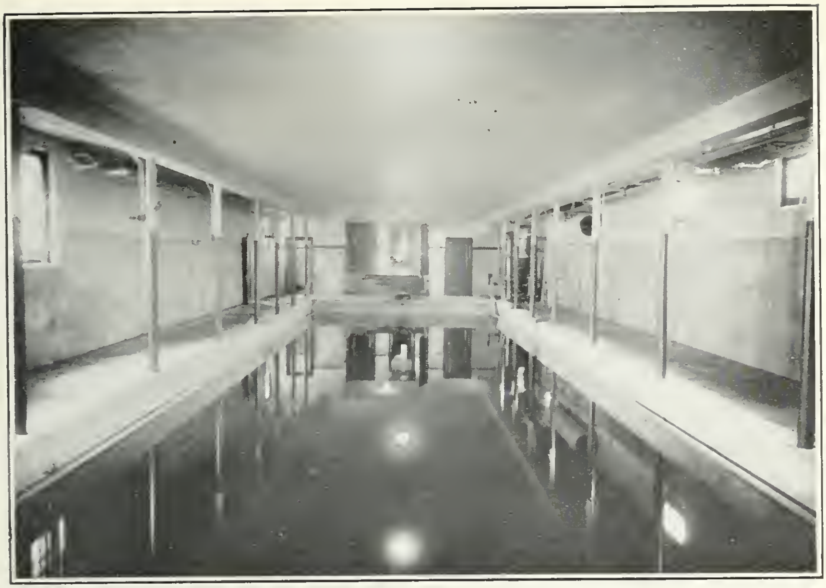

Fig. 5.—Swimming pool. Hospital Corpsmen's recreation building, U. S. Naval Hospital. Chelsea, Mass.

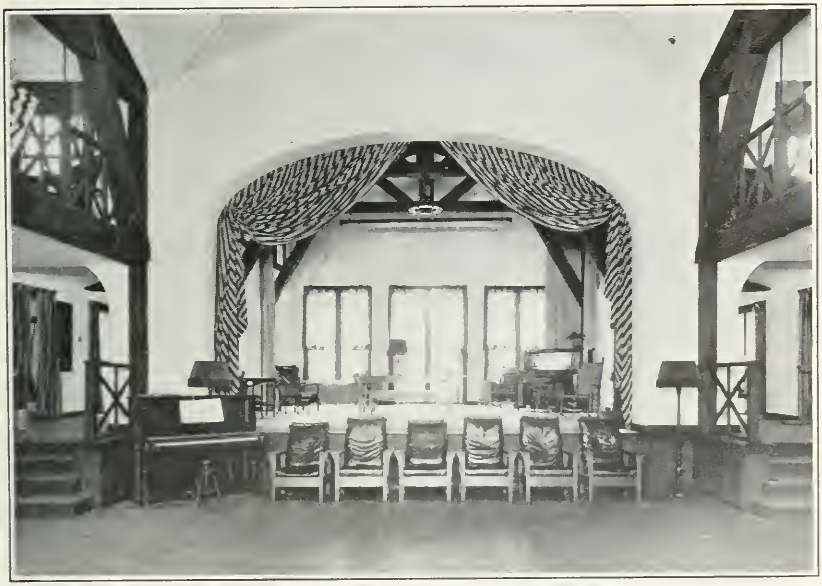

Fig. 6.—Interior Convalescent House, U. S. Naval Hospital, Gray's Ferry, Philadelphia, Pa.

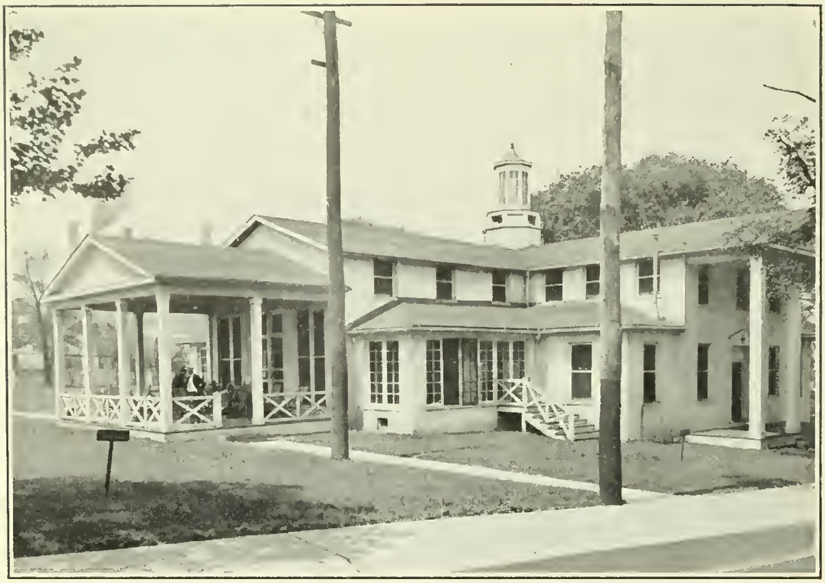

Fig. 7.—Convalescent House, U. S. Naval Hospital, Gray's Ferry, Philadelphia, Pa.

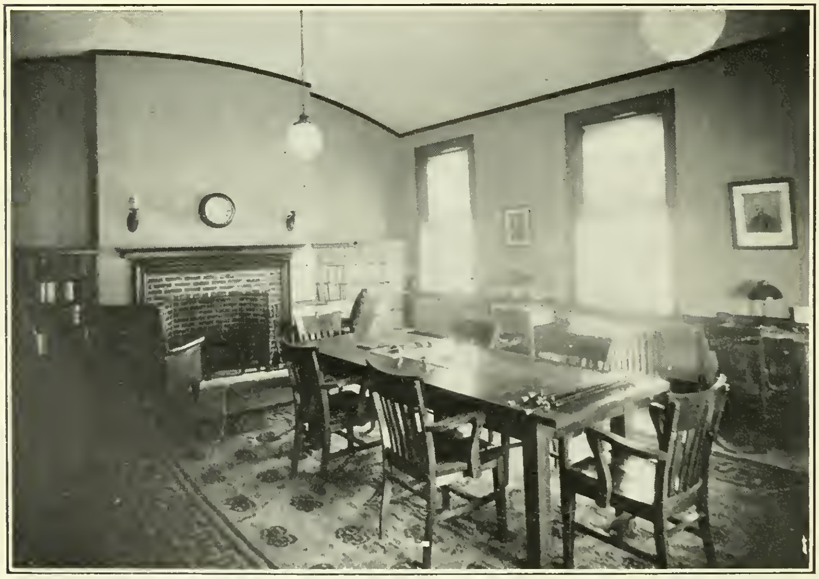

Fig. 8.—Reading and Writing Room in Hospital Corpsmen's recreation building, U. S. Naval Hospital, Chelsea, Mass.

to select the object he desires to make from among those materials which are provided. It has been felt that this form of diversion and occupation has been instrumental in reducing the number of sick days at the particular hospitals where it has been applied. Bazaars are held by the Red Cross for the disposal of the articles made in the various governmental institutions where they are active in this work. These bazaars have been well patronized by the public and the articles have been readily sold. Psychiatric patients are good subjects for occupational therapy or recreation and it has been very interesting to hear the testimonials of the beneficial results accomplished with this class of patients. Occupational therapy as well as a definite, systematized recreational program is now in force at the Government Hospital for the Insane. It has been felt that patients react more favorably to treatment since the inauguration of recreational activities. A prevocational shop is now in operation at this institution.

I have stated that occupational therapy has been conducted by the Red Cross. It would seem desirable that this should be cared for by the Navy. The importance of this recreational feature with its more or less therapeutic value would seem to be of sufficient importance to warrant its being made a permanent activity. Whether specialists should be employed to teach the various handicrafts or whether the nurse should be trained in their application is a question for thoughtful consideration and decision. If there are regulations which now operate to interfere with the Navy's conducting it, it is hoped provision will be made for correcting existing deficiencies.

Libraries in hospitals have received special attention as they rightly deserve. Possibly no entertainment feature is as important to an institution as libraries and library service. Hospitals have had libraries for many years. Books had been acquired upon requisition and by contribution. There were some really very attractive collections before the war. The American Library Association was authorized to assign librarians to the hospitals. During the war special attention was given to the accessibility of books, open shelves were provided, and libraries brought up to date, quantities of new books were added and a systematic cataloguing put in force. The new practice did not mean that libraries were abused but it did mean that they were extensively used. Men were encouraged to read. Their own inclinations were respected in the selection of books but efforts were made to direct them in the channel of proper and beneficial reading. As a result at the present time, from two to five books are read per man per month in hospitals. The average on battleships well equipped with efficient libraries is about one per month; the average for public libraries in various cities is one-quarter book per man per month. The comparison is merely of interest. It is appreciated that greater opportunities for reading exists in hospitals. I dare say that in the old days the foregoing statements certainly could not have been made.

In hospitals reading matter is of much more relative importance than at other stations. Bed, ambulant patients and convalescents derive immeasurable enjoyment from reading. Long, tiresome hours are passed away profitably in reading. For some few patients reading is the only form of diversion in which they are permitted to indulge, because of the nature of the case. There are abundant opportunities for the recreational reading of books and magazines, and even for study. Very serious attempts have been made to make the Navy one of the greatest educational institutions in our country. The habit of reading acquired during illness and convalescence has been of great value later on in life. Reports have been received from public libraries, stating that men who had not been in the habit of using city libraries, have formed such habits from the opportunities afforded during the war, and have referred to the books which they have read in hospitals and at stations during their period of service.

Library service was transferred to the Navy Department, November 1, 1919, and the responsibility for its continuance was assumed by the Bureau of Navigation acting through the Bureau of Medicine and Surgery and the commanding officers of hospitals. Unfortunately, it has been possible for financial reasons, to retain only five trained librarians at as many Naval hospitals. Several other hospitals with smaller complements, or for reasons based upon proximity to other Naval units, are aided by part-time services of librarians detailed to Naval stations and districts.

Besides books, periodicals and newspapers have been supplied. Twenty subscriptions for each hospital were placed for the current year. Newspapers are selected from a number of the largest cities throughout the United States.

Nothing is more discouraging to the reader than to see shelves filled with dull and uninteresting volumes. It is the duty of the librarian to weed out and discard the dead stock and by frequent requisitions to add to the shelves the most desirable of the recent publications. In addition, the individual in his reading needs advice, especially so in the case of enlisted men who have not formed the habit of using libraries and who are often deficient in elementary education. Very few enlisting in the Navy, at present, have had the benefit of a high school education; many of them have not even finished grammar school, hence help and guidance is needed, but it must be provided tactfully by someone who knows books and human nature and who has had successful experience in the art of supplying books to readers. There is a knack in fitting the right book to the right person. This is the most important work that a librarian can do. It has been observed that a higher grade of reading is developed as men become accustomed to libraries and books, and they are no longer satisfied with poor material. The librarian watches this development with much enjoyment and satisfaction and tries to aid wherever possible. The library, however, is not a compulsory school, and the librarian is not an instructor. The hospital library is designed to furnish a means by which officers and men can obtain information and opportunity for study, education, and recreation should they desire to use it.

Probably the service most appreciated in the hospitals is the visit by the librarian to the wards with the book truck. This conveyance was designed especially for hospital use and consisted of two shelves placed on double wheels. It carries 40 to 50 books and magazines. It is constructed of such a height that the bed patient can examine the contents without rising up in bed. This truck makes it possible for each patient to select such books as he may desire, instead of having a volume thrown at him with the implication that he could read that particular one or none. All of us prefer to select our own reading material. We welcome suggestions, but like to make the final choice ourselves. It is intererting to know that, in certain psychopathic cases, the use of local newspapers from the men's home towns was tried with favorable results. The delusions in individual cases were broken up by the receipt of such newspapers. It was especially effective in one case where the man believed that physicians, nurses, and attendants were Germans intent on poisoning him. The visits of the librarian in civilian clothes with home newspapers seemed to bring insight, with a disappearance of the delusion.

The libraries are of course available for the use of officers, nurses, and hospital corpsmen, as well as patients. No attempt is made, however, to supply professional medical books. Some hospital libraries contain as many as 4,000–7,000 volumes.

The following is abstracted from a report of a hospital librarian, received for the month of June, 1920:

Monthly attendance in Reading Room	2,400	
Monthly attendance in Convalescing Room	5,000	
Inventory taken this month:		
Books on hand: Fiction	1,965	
Non-Fiction	1,671	
		3,636

Three hundred and thirty-six books added this month to library.
Daily visits to all wards, and following reading matter distributed:
250 Magazines sent from Salt Lake Public Library;
1,000 Magazines gathered from the Vallejo Newstands;
44 Sunday editions of the *New York Times.*
10 Important newspapers received through the Red Cross.
15 New magazines received through the Red Cross.
17 New magazines received through Alex. White Fund.
20 New magazines received through the Sixth Div. Bu. Nav.

Have had quite a few requests from the wards for technical works.

There is especially a great clamor for books in Lock Ward. Many of the patients here are from the Naval Prison and are very eager for reading matter. Some of the boys take 3 and 4 volumes at a time and say they can read one each night.

How expenses of librarians are to be defrayed in the future seems problematical. I feel that the larger hospitals should be supplied with them and their salaries covered by government appropriation.

The convalescent houses (fourteen in all) constructed, furnished, and donated outright to the Navy by the American Red Cross have met an inestimable need, and have and are rendering a service which must be daily and intimately observed to be adequately appreciated. Where these houses have been provided, all indoor recreational activities are centralized. Librarians and Red Cross representatives have their offices in these buildings. Where there are no convalescent houses, the Red Cross has assisted very materially in furnishing recreational wards or centers. The attractiveness of both houses and wards can best be appreciated by reference to the accompanying illustrations. Some convalescent houses are so designed as to provide sleeping accommodations for visiting relatives of patients. At certain stations, the contour of the ground has been taken advantage of to provide basement space underneath these houses, where barber and tailor shops are conducted, for the convenience of the hospital and patient personnel.

It is the desire to make these buildings and centers as club-like as possible. The atmosphere and environment must be made cozy, comfortable, and attractive. Men must and can be trained to respect and care for the surroundings which will operate for their comfort and contentment. The decent element of society more than out-numbers the uncouth, indifferent, unappreciative group. The wills of the majority will be enforced on the minority, if the commanding officer takes the personal interest in his institution that he should. Issuance of orders like laws is absurd, if there is not enforcement. My observations of every hospital have convinced me that convalescent houses and recreational centers can be maintained in a most attractive manner with few infractions of discipline, if the commanding officer's pride in every portion of his institution is reflected in the personnel under him. Where there is a lack of appreciation, it bespeaks of faulty administration.

These convalescent houses are considered in instructions which have been issued, as "wards" of the hospital. They are government property and their maintenance is properly governmental. It seems strange to find some commanding officers regarding these buildings as separate and distinct from their hospitals.

I have made mention of Home Service as carried on by the Red Cross for the Navy. This service has been of incalculable value to hospitals. There are some institutions that have not availed themselves of the full service that might be rendered under this heading. It is most difficult to even outline just exactly what all the service comprises, but, in a general way, it might be summed up under the following divisions:

(*a*) Persuading men in the Navy to communicate with their families and the families to communicate with the men.

(*b*) Rendering assistance, upon request, in handling the business difficulties of the men or members of their families.

(*c*) Providing information regarding the Government's program for the welfare of the men, such as allotments, allowances, insurance, vocational training, etc., and assistance in handling difficulties in which they are involved.

(*d*) Friendly visits to the men when sick or disabled, and keeping their families advised of their progress when advisable and when approved by the commanding officer.

(*e*) Investigations of home conditions at the request of naval officers for confidential information needed in considering questions of medical care and treatment, as well as furlough or discharge.

(*f*) Locating families of men in the service, or locating men for inquiring families.

(*g*) Arranging friendly visits to families on request of men in the service.

(*h*) Arranging relief in distress among the home folks on request of men in the service, whether relief is financial, legal or medical.

(*i*) Reporting and caring for sickness among the home folks.

(*j*) Taking the man's place in so far as may be possible in adjusting any difficulties in which his family may be involved, or in protecting them from any dangers which may threaten.

(*k*) Visiting men who are absent from the Navy without leave or over-leave, in order to talk with them and with their families about their duty to their country and to the Navy in fulfilling their obligations as good citizens and persuading them wherever possible to return to their stations voluntarily. The American Red Cross accepts this service as a friend of the man and his family in helping him to see his duty in its true light and not in any sense as a police or law enforcing agency. It is felt that considerable misunderstanding regarding the seriousness of the offenses can be cleared away by such visits, to the great benefit of all concerned.

The Red Cross does not consider that it has any prime responsibility in connection with the various items of the Government's program. Its facilities are freely offered in rendering every possible assistance in handling difficulties as outlined under paragraph (*c*), but only as a supplement to the facilities of the Navy. It is possible for the Red Cross to bring to the immediate attention of the various bureaus perplexing problems which are worrying officers and men, and through coöperative relationships to follow them through to solution, but only as a supplementary agency.

A prime responsibility, however, is recognized in respect to the family problems of the naval personnel. The Red Cross is anxious to fulfill this responsibility in assisting to make home influences helpful and in bringing those influences to bear on the man in the service for his benefit and for the benefit of the Navy. Assistance in handling difficulties regarding the Governments' program is considered valuable mainly because of the close relationship which is thus made possible with the men, so that any more personal problems involving family relationship may be discovered.

This service to be effective must be readily available to the men, so that the difficulties which might cause worry and serious disturbance of morale may easily be brought to the attention of Red Cross representatives. This was one reason that representatives are provided with office quarters within the hospital reservation. Close coöperative relationship is thus established with officers and men. Home Service has very materially helped to minimize discontent in the Navy. It has added greatly toward contentment; mental anxiety breeds the very worst demoralizing influences.

These Red Cross workers at hospitals assist patients in matters of handling correspondence, writing letters for bed patients and trying to stimulate home communication. Commanding officers should not request nor permit these workers to assume any responsibility that is their own in the matter of correspondence with relatives of patients relative to the latter's physical or mental condition.

The Home Service and Medical Social Service work at one of our hospitals has been of such a high order that the Red Cross has the authority to train workers there, who go out to Army, Public Health, and other Naval Hospitals as specialists in this particular field. At another hospital, it is interesting to note in reports, recently received, that even with an appreciable decrease in the number of patients, the number of Home Service cases for May, 1919, was 20 in comparison with 341 cases for April, 1920. As the Navy appreciates more and more the scope of Home Service, there must be expected an increase in the number of cases brought to the attention of the Red Cross.

To show a type of Home Service case, which is very interesting, the following is taken from a narrative report of a certain Field Director:

> Patient was admitted to this hospital on September 22, 1919, and soon after his admission he told the Red Cross worker that he was very anxious to locate his two brothers and a sister, but was afraid it was impossible, as he had been trying for the past ten years to find them. The patient was the oldest in his family, and had been adopted at the age of seven. His brothers and sister were placed in an orphan asylum at that time, and although patient made repeated inquiries at the asylum, he had never been able to get any information as to their whereabouts. By calling upon the help of the local Home Service, we were able to get the present addresses of the sister and the two brothers, all of whom had been adopted from the asylum. Patient wrote to them at once and received immediate replies. His youngest brother, age 20, had no idea that he had any relatives in the world and his joy at finding that he had any was quite pathetic. The other brother and sister, age 25 and 23, respectively, knew each other, but did not know they had other relatives. Now, all four are writing back and forth and exchanging pictures and life histories. The two

brothers discovered that they both served overseas in the 26th Division. All three have been to the hospital to see patient and they are all happy at having found each other.

Up to this time, the patient had wandered around the country with no particular home and no ambition. He says now that he has his brothers and sister he will lead a very different life. He will be leaving the hospital with a medical discharge in a few days. He hopes to get a steady job and settle down near his brothers and sister. He says it makes a big difference to one when he has really someone belonging to him.

Red Cross representatives have assisted the men about to be discharged in matters of vocational training; and, in the absence of field representatives from the Federal Board for Vocational Education, advice has been given these men relative to this important subject. For a time, the Federal Board maintained officials at the larger hospitals, but now the field is covered by visiting representatives.

All Home Service is handled by local Field Directors, Home Service Sections—of which there are 3,687 scattered all over the United States—local community Chapters, Divisions and National Headquarters. Someone has tritely said that the only red tape in the Red Cross is the two little pieces which make up the cross. The above channels do not exist for the purpose of passing all matters through them. The quickest and most direct route is practiced in gathering information and in applying Home Service. The office of the Director of Bureau of Naval Affairs at National Headquarters is frequently consulted for advice and direction, but his office is one for the adoption of policies and liaison between the Red Cross and the Navy Department. A pharmacist acts as the assistant to this Bureau, whose duties are principally connected with Home Service, and it has been possible in this manner to expedite compensation, allotment, and war risk insurance claims; Liberty and Victory bonds and State bonds, and various and sundry problems which require investigation and for which Red Cross assistance has been solicited. These problems are administered with due respect to naval procedure, naval regulations and customs. It is surprising how many ex-service men appeal to the Red Cross for advice and assistance when the Navy Department should be directly addressed.

A beginning in a large undertaking has been accomplished. Morale work in hospitals has a future which requires a broad, sympathetic, interested vision. Discouragement and failures must be anticipated, but the stability of those responsible for the establishment of the highest type of morale must be undisturbed. There must be but one goal—that of successful accomplishment.

The first pamphlet published by the Bureau of Navigation, Sixth Division, has some very sane remarks relative to morale work in general in the Navy. To quote a paragraph, with which my thoughts are in entire accord:

> There is still a certain school of thought in the Navy, which pictures the Bluejacket as a "hard" man. By the term "hard," this school holds that the sailor must be a little tough in times of peace if his moral fibre is to stand the rough hand of war. If being hard in time of peace merely meant that the man was stern with himself and perhaps self-disciplined to a Spartan degree, the idea would be absolutely correct. Just here, however, steps in the human equation which all too frequently interpret "hardness" as pure "toughness," which, in the last analysis, means self-indulgence and the falling into practices both evil in themselves and evil in their effects on the fighting efficiency of the service. This school of thought numbers among its adherents some of the best officers of the service, who have not been educated to the effects of disease which springs from self-indulgence and drunkenness, to the lowering of morale which comes from a consciousness of indulgence in forbidden practices. The adherents to this theory are nearly all men of high rectitude who have bound themselves to a Spartan life. We must recognize that these officers are men who have a certain justice in their theories and need only education to make them the most earnest adherents to our mission. They are to my mind the most essentially honest men of the service and though their theory is antagonistic, still we must not decry it, but rather endeavor to educate them to a broader conception of morale. It, therefore, behooves us to watch carefully any means of carrying out our mission which in any way tends to softness or ease.
>
> The phrase "Iron men on iron ships" is a good old Navy phrase, but perhaps has passed, and the phrase should be rather "Steel men on steel ships" with all the qualities of steel; high timbre, essential purity, resiliency to blows, above all, elasticity, so that however hard the shock, character springs back of itself to original form and direction.

I do not believe many of our medical officers suffer from inertia, but we in the Medical Corps of the Navy must plead guilty to a certain amount of naval conservatism and for that reason I am quoting again from the same aforementioned pamphlet:

> Of all the enemy forces with which any new plan will have to contend, inertia and the *innate conservatism of the Navy*, will prove the most serious. This conservatism may spring from a very true and proper belief that what has gone before and has proven its limited worth is good and can not be improved upon without danger. Inertia springs from pure mental laziness, that of the small mind following in the steps of some stronger mind rather than working out for itself the proper solution of a problem. Only by success in the execution of our mission can we overcome

this conservatism. We must be careful not to offend the tender susceptibilities of conservatism; we must, in putting on the new thing, perhaps dress it in the garb of the familiar thing; and above all we must endeavor to work out our plan without putting too great a strain on the energies of those cursed with inertia. It is proper to say here that the conservatism of the service is in many ways a valuable asset, requiring any plan to demonstrate its absolute merit before adoption; it is founded on the stark actuality that the Navy is at present an efficient fighting machine; that the importance as the defense of the country is vital and that the responsibility for any change in its methods is a very serious thing. The Captain of a ship is always in danger of losing his ship and the lives of the men in the ship and must of necessity be convinced of the correctness of any method before adopting it. While it is true that inertia springs from laziness, there is another reason equally true for inertia. This is the natural reluctance of a busy man to undertake any new thing or to even undertake the study of a new project whatever its potential merit. It will be well to bear in mind that the officers of the Navy are very busy men.

Morale is either poor or good. If it is poor the degree of coöperation and unity is slight and the individuals making up the composition are held together and made to act only by fear or force.

Morale can be classed as good when the minds of individuals are so firmly fixed on an accomplishment to be achieved that common understanding, purpose, and determination express themselves in voluntary coöperation; in voluntary adjustment of the relations between individuals; in voluntary obedience and in cheerfulness, patience, and enthusiasm. That individual morale may always be maintained at its highest pitch, there must be a certain amount of pride in one's self, combined with happiness and contentment, so that when the time comes when death stares us in the face, each can feel like the brave Marine who wrote his wife just before going into battle after having tasted battle:

If I should die in France,
Weep not for me.
Proud in life,
I proud in death will be,
And proud men ill bear tears of sympathy.

If I should die in France,
Sing then for me;
For joy in life I've had and jollity
And joy in death I'll have
Weep not for me.

—*Perrin.*

NEUROLOGIC SERVICE IN NAVAL HOSPITALS

By Lieutenant Commander R. SHEEHAN[1]

Medical Corps, United States Navy

IN CONSIDERING methods of caring for naval patients with nervous disorders, it seems desirable to bring to attention the experience acquired in a number of years of such duty, particularly with some conclusions based upon it, as well as suggestions relative to these, which might tend to increase efficiency.

By the term "neurologic" it is intended to adhere to the conception that this should include not only the organic disturbances ordinarily described under this heading, but all conditions affecting the nervous system, whether manifested at the physical or the psychical level.

This class of disorders has always caused considerable difficulty when an endeavor has been made to fit them into what really is a general hospital, oftentimes without adequate provision for their care, or knowledge of the particular requirements necessary to attain results comparable with those so clearly demonstrated by the Navy in surgery and the other branches of medicine.

There should be a comprehensive approach, allowing cognizance of the fact that such a service must care for peripheral nerve injuries, organic nervous disorders, the neurosyphilitic involvements, the psychoneuroses, and occasionally, through leaks in our recruiting methods, a mental defective or psychotic. Also it must be considered that many of these patients may be general court-martial prisoners, who necessarily must be cared for, at least temporarily in their status of prisoners, which fact serves rather to complicate their treatment.

The proportion of these cases in the general hospital population will fluctuate considerably, due to various factors. For example, during the war there were large numbers of psychoneurotics, and peripheral nerve injuries to an extent which would never occur in peace times. This is important because of the difficulty entailed when we wish to construct during peace a service capable of unit expansion in time of war.

The United States Naval Hospital, New York, will serve as a type upon which to base conclusions readily adaptable to the other naval hospitals. It is the most important, because of its situation, which makes it receive most of the cases emanating from the Atlantic fleet, and also because it has tributary to it a great number of stations.

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The neurological service should be a part of the medical side of the hospital. In general, neurological cases can be taken care of in the medical wards. If their number becomes large enough, a whole ward should be set aside for them, and designated as the Neurological Ward. This will facilitate administration and treatment.

In creating the service, first of all, it should have in charge a neuropsychiatrist capable of properly conducting it. His experience should have been such as to enable him to have a comprehensive grasp of the cases coming within his purview. This connotes competence to make final diagnoses in neurologic entities, also a knowledge of proper therapy, and adequate service insight.

He should have one or more assistants, depending upon the size of the service. These should always be assigned definitely, for periods long enough to give them opportunity for training in this field. Care should be taken to avoid the selection of men who are not interested in this branch of medicine. It is well known that few physicians have a liking for psychiatry; in fact, some have a distinct antipathy, while the makeup of others precludes their being of value.

This same personal equation should be evaluated in choosing the rest of the personnel, both nurses and hospital corpsmen. Here, success in treatment is dependent more upon this factor than with any class of cases.

The different groups of disorders manifestly required dissimilar handling. Therefore they are best considered separately, but still as components of a unit service.

The peripheral nerve injuries invariably are admitted upon the surgical service, in consequence of gun-shot wound or other traumata. In most instances they require surgical consideration until the maximum result is obtained. However, even from the beginning neurologic observation and opinion may be necessary, not only for diagnosis, but often to determine the indication for surgical intervention. This is especially true, where this necessitates electrical estimation of muscular reactions, and accurate determination of the degree of involvement, as well as for prognosis. Here the best interests of the patient indicate his retention upon the surgical side, so that the neurologist should be used in a consulting capacity. When the case has ceased to require surgical attention, but still needs treatment for the residuals of the injury, he should be transferred to the neurological service for continuance.

Organic nerve lesions, comprising what are usually chronic cases, requiring indefinite hospitalization, are rarely retained in naval hospitals longer than is necessary to determine the diagnosis and prognosis. When this is accomplished, and if they are found to be unfit for service, they are recommended for discharge. In the interim they are properly cared for in the neurologic ward.

Syphilis of the nervous system in any of its manifestations invariably renders the patient unfit for the service, so that he is discharged as promptly as circumstances permit. However, it is required that he be given the treatment necessary to obtain the maximum result before such disposition. Again, there are exceptions, especially with long service, where the conditions are such that their retention in the service may be desirable.

No doubt these cases should be upon the neurologic service, where their treatment can be given with the utmost consideration for the nervous system. They require different therapy than the acute syphilitic cases, which are properly assigned to the genitourinary department. Whenever the treponemata have invaded the cerebrospinal axis the patient should be transferred to the neurologic service for treatment and disposition.

The psychoneuroses are always a very important consideration. This has been especially true during the war, and subsequently, as they have formed a large proportion of the total of neurologic cases. Normally the Navy does not have to contend with this group of disorders to such a great extent. The service is such that it does not appeal to the type of individual who is prone to develop such reactions. However, the Selective Draft Act compelled many such to enter some branch of the service, and in this district there is no doubt that large numbers chose the Navy, which thus obtained an undue proportion because they believed by doing so they would avoid active duty in the war zone. The patients admitted with these disorders clearly substantiated the well-known racial predispositions to their occurrence.

In this group are included hysteria, with its multiplicity of manifestations, the mild obsessional states, neurasthenia, the traumatic neuroses, and psychasthenia. In fact, all of that great group, which during the war were so improperly described as "shell shock," or by such titles as "cardiovascular asthenia," "hyperthyroidism," "dyspituitarism," "endocrinopathy" or even epilepsy, when, as a matter of fact, the symptoms displayed were but evidences of the inadequacy of the individual to adjust or to meet the requirements of his duty, manifested at the physical level.

There is no class of patients which will require more skillful and careful handling. Hospitalization often tends to aggravate these conditions by permitting fixation of the conversion mechanisms present, or the engrafting of additional symptoms, through imitation, by the ready appeal to their characteristic suggestibility.

There is no doubt that, when an individual under ordinary service conditions develops a psychoneurosis, he has demonstrated clearly his unfitness for retention in the military service. Manifestly such could not withstand the stress of war, and even where the precipitation of the psychoneurotic reaction is definitely referable to an act of duty, it is doubtful whether the patient can be rendered fit for return to active service. This is particularly true in the case of officers who are likely to be called upon to bear great responsibility.

The treatment of this whole group of disorders should be primarily along psychotherapeutic lines. This again emphasizes the need of having the services of a well-trained psychiatrist, for none other is capable of utilizing such measures to advantage. It is in the treatment of this class of cases that the services of the physical therapy department will be of great advantage. This, in the Naval Hospital, New York, has been developed to the best possible degree, which will be the subject of another paper at this meeting.

With these patients great care must be taken in their hospitalization to prevent their aggregation in groups which will permit too close contact and extensive fraternization, with opportunity for the discussion of their symptoms, to which they are so prone. As an instance of the damage, possible through neglect of this precaution, may be cited one which occurred during the war when the capacity of the hospital was heavily taxed. This was the development, *de novo,* in the ward of five facial tics, which were clearly imitative, as they followed the admission of one. For such reasons a general hospital is usually not desirable for the prolonged treatment of this class of patients. They require opportunity for extra mural care, also facilities for diversional and occupational therapy. In the New York Hospital the enclosure is large enough to permit the employment of patients about the grounds. Also there is a well-organized occupational service, which factors are invaluable as auxiliary measures.

These cases should only be continued under treatment if it is definitely determined that they can be readjusted to such an extent that they will be of distinct service value. Otherwise they should be discharged, for it is true that frequently their service experience exposed and would serve to perpetuate their disabilities.

It is with this same class of patients that there has been, particularly during the war, considerable difficulty in successful handling, due to the interest taken in them by the numerous auxiliary and semiofficial agencies, which were established, or augmented their activities during the war, with the intention of assisting the military services. Their efforts were in a large measure well-meaning. However, there is no doubt that in most instances, with this class of patients they have been prejudicial, and have to some extent invalidated well directed and indicated methods of treatment.

From the mere fact that an individual has exhibited the characteristic reaction of this class of disorders, it is presumptive that his makeup is such as to render him particularly susceptible to the sympathy, humoring, often coddling, and encouragement to resist treatment, which these patients receive through interest, invariably based upon an erroneous conception of the mechanisms underlying the production of the patient's symptoms, as well as a total disregard of the well-founded belief, based on ample neuropsychiatric experience, that the essential object to attain by all therapy in this class of patients, and the one upon which success depends, is a rehabilitation of the patient's morale. That is, a restoration of his confidence in his own ability to efficiently cope with his responsibilities, with an effectual minimization, of his tendency to introspection, dependence upon others, and exaggeration of the subjective symptoms, which constitutes the ever present defense reaction.

While in other classes of patients the assistance of workers connected with these auxiliary agencies is possibly of some value, there is no doubt that, with the psychoneuroses, the possibility of damage is so great that it seems mandatory to retain the entire handling of them within our own jurisdiction. Much of this work has been done by women, and observation has shown that the motivation of the interest taken in these patients has usually been dependent upon a reaction in the worker which is compensatory for the derailment of the normal instincts, mostly the maternal, but in others no doubt, as our Freudian confrères would say, as a compromise attempt to sublimate the *libido.*

Also it has been interesting to note even now that the war is over and the excuse practically gone with what reluctance the many workers doff their uniforms and return to their pre-war diversions. This cannot be explained entirely by the endeavor to retain remunerative positions, because in some instances no salaries have been paid.

It would seem that the service men, both in and out of hospitals who are amply looked after by government agencies, have had little difficulty in being surfeited with attention, whereas with women and even crippled children where like attention would prove of untold value they receive little or none of it. Can this be attributed entirely to patriotism, and the stimulation of the panoply of war?

It is hoped the establishment of the so-called sixth or welfare division by the Bureau of Navigation will enable naval hospitals to be self-contained, and thus remove the excuse for any intrusion of extra-service agencies, which are without our control and therefore cannot be otherwise than productive of difficulty in caring for our patients.

This factor may appear to have been unduly emphasized, but it has been productive of so much difficulty, through the conflict engendered in the patients, that we should be entirely aware of its importance.

This leaves to be considered the psychoses, and with them, the borderline cases requiring treatment or observation to determine their proper disposition.

In the Navy the true psychoses are not an important factor. The estimate made for the Army was that with 500,000 men in peace times there would be 1,500 such patients, and in time of war that there would be 4,500, which is less than 1 per cent. Adapting this to the New York Hospital, which could be expected to care for at the most 3,000 patients in time of war, would mean provision for less than thirty psychotics. However, it is doubtful that the percentage would ever be so high, due to the Navy method of enlisting and training men, and this conclusion is substantiated comparatively by the proportion in percentage of men from the naval service which have come to the attention of the Public Health Service in connection with its medical supervision of the beneficiaries of the Bureau of War Risk Insurance.

For a number of years the Navy has given considerable care to the exclusion of the mentally unfit, so that there has been devised a definite method which unquestionably has been successful. The establishment of this has been due in large measure to the support of the present surgeon general, Rear Admiral Braisted, whose experience and interest has enabled him to appreciate its desirability. This consists first in having psychiatry as a major subject in the course of the United States Naval Medical School, where the student officers have presented to them in lectures the relations of psychiatry to the service, and clinically, at St. Elizabeth's Hospital, the consequences to be expected where the method failed. This has resulted in equipping to a considerable extent, which it is hoped will continue to progress, the medical officers on recruiting duty with psychiatric ability, which the average physician does not possess. Then at the several training stations there has been built up a definite scheme, which during the war was expanded into psychiatric units, which during the period of training subjects the recruit to observation, and if indicated intensive examination. It has referred to it by the line officers in charge of training any men who come to attention because of peculiarities, abnormal behavior reactions, inability to succeed in training, evident retardation or court-martial offenses. Thus it is readily seen that this permits the elimination of practically all men who might have succeeded in passing the recruiting office examination, where there is not adequate opportunity for necessary observation, so that the chance of a mentally unfit individual getting to duty at sea is very small. This is especially true for the defectives of all classes. Here also should be noted that it is accepted practice in the Navy to have general court-martial prisoners subjected to mental examination prior to trial. This has prevented in many instances the trial of irresponsible individuals. These examinations properly devolve upon the neuropsychiatric service of the hospital, unless there is a psychiatrist especially detailed for the purpose, which is the case in New York. It also includes rendering expert testimony in mental cases when this is required by the General Court-Martial. Here opinions are often necessary upon the question of malingering and upon responsibility for offenses charged. This is especially important, as it has seemed in the service that a defense upon some medical ground is often made when none other is available.

For the true psychoses, it is particularly essential to provide a separate part of the hospital, preferably a pavilion, distinct from the main structure. This is desirable for many reasons. Mental diseases as a whole are considered disagreeable and surrounded with such a cloak of fear, disgust and even superstition, to those presumably of such an intelligence level that they should be able to comprehend that such patients require care and treatment as do any others. The usual attitude of general hospitals is opposed to their retention, or in most cases, even their admission.

Separation removes, what is at times, a disturbing element from the general wards. It permits specialized treatment which facilitates recovery, or at least guarantees proper and expeditious handling.

It avoids also the confinement of disturbed patients in so-called prison or closed wards, a practice which is to be particularly condemned, as these do not permit opportunity for proper exercise, diversion or occupation, and can result in nothing but demoralization, as such care is absolutely prejudicial to obtaining good results, and distinctly opposed to the modern conception of the treatment of mental diseases.

In such a pavilion should be treated all disturbed cases, the borderline conditions requiring observation, drug addicts, where close supervision is necessary to verify diagnosis before disposition, also such patients as develop deliria, and might temporarily require removal from the main building.

This pavilion should be as far as possible self-contained. It should be provided with a diet kitchen and quarters for the nurse and attendants. It should be arranged so as to permit isolation of disturbed patients in especially designed rooms. There should be an enclosed porch to permit exercise, while at the same time preventing elopement. It is necessary to have a complete hydrotherapeutic equipment, including showers, douches, and at least two continuous baths, designed in accordance with those utilized in psychiatric hospitals. There should also be an electric or hot-air cabinet, and tables with the necessary equipment to give hot and cold packs.

In conclusion it seems well to suggest for consideration the idea that the Navy, or perhaps the Army and Navy together, should provide a hospital to care for officers who are retired because of mental diseases. This would assure them the same care that officers receive who suffer from other diseases. At present their hospitalization is not in accord with what they deserve.

STANDARDIZATION OF MATERIAL

By Captain A. FARENHOLT

Medical Corps, United States Navy

IT IS acknowledged that one not recently familiar with the working of central administrative machinery assumes a difficult rôle in suggesting the possibility of changes in central methods. The writer also admits that it may be found extremely difficult at times to put theory into practice.

It is believed that substantial advantage would result to the corps if the principle of standardization of material was completely and thoroughly carried out. Large business houses employ this principle and the head of the department, often the "buyer," is an important person and under a very substantial salary.

The advantages which would result to the corps would be classified as:

1. Economy, special government rates or good bargains.
2. Evolution of more ideal and standard equipment.
3. Rapidity and ease of supply.
4. Better relations with contractors and merchants.
5. Less frequent and more uniform surveys.
6. General familiarity of standardized bureau's equipment.
7. Greater efficiency and contentment.

To carry out this system it is believed that it would be necessary to establish a "standardization desk," or branch, under the matériel officer of the bureau. This desk would attend to the following business:

1. Standardization of equipment.
2. Recommendation of award of contracts.
3. All material surveys.
4. Relations to yards and docks (advice).
5. Relation to supply department (full knowledge of all lines of supplies carried).
6. Relation to outside business houses.
7. Relation to M. and S. supply depots.
8. Knowledge of markets, products of supply houses, suitability of their output, reliability, delivery, etc.
9. Knowledge of transportation facilities.
10. Reports of nonstandard equipment purchased outside of the United States or on special authority of the bureau.

To illustrate: The bureau is willing to approve the request of the commanding officer of the naval hospital, Chelsea, for 25 wheel chairs. The officer in charge of the standardization desk refers to his records and finds that the Jones Wheel Chair Company of Detroit, Mich., had been awarded the yearly contract. Therefore, this officer prepares the order for the Jones Company to ship to Chelsea 25 of their type-A wheel chair. The selection as standard of the chair furnished by this firm was made after examination of all the wheel chairs on the market, after consideration of prices and after examination of the requirements of both naval and civil hospitals. Under the present method, the purchasing pay officer at Boston receives the authority to purchase; he sends out bids. On their receipt he asks the commanding officer at Chelsea to recommend and award. The commanding officer examines the description of articles or the cut submitted; possibly he goes to Boston to see what a local firm offers. At all events, unless he has some special knowledge of chair making and value, plus an appreciation of hospital requirements, his choice is not apt to be judicious; also, he is held down to the lowest bidder unless he is able to satisfy the purchasing pay officer why another bidder should be favored—not always an easy matter. He may reject the article on inspection, but specifications, as he is able to frame them, are often not explicit enough to cause rejection.

Again, the commanding officer of the naval hospital at Great Lakes asks for a dining-room table, chairs and sideboard. It is approved. The standardization desk finds that the Capitol Furniture Company has the award for this class of furniture and issues the order for set B, delivery f. o. b. Great Lakes, time, ten days (all furniture standardized after consultation of the Bureau of Yards and Docks). As at present, the commanding officer, after receiving the merchants' bids, probably goes to Chicago and visits the showroom. He or possibly Mrs. C. O., or some other member of the household, selects a set—it may be suitable or unsuitable; it may be Louis XIV or "Ivan the Terrible." It may be a good value or he may be cheated. However, that set must be used for many years, frequently to the mortification of his successors and the detriment of the purchaser's fair name. As the standardization officer has primarily made selections and awards after careful consultation with the Bureau of Yards and Docks, the result could not fail to be better.

The above is written with the knowledge that the bureau has recently adopted the furniture allowance list prescribed by the Bureau of Yards and Docks, and has taken the advantage of obtaining furniture on their annual contracts. However, out of four furniture requisitions for the Mare Island Naval Hospital in the past eight months for staff, nurses' and sick officers' quarters, the only furniture obtained from the Yards and Docks annual contract was the requisite number of rugs and two beds. The greater number of items had to be selected, as outlined above, from meager stocks at exorbitant prices.

The naval hospital at Norfolk, Va., requires a new operating table and dressing cabinet for the main operating room. The standardization desk issues an order on the Empire Company, Madison, Wis., the firm having the contract for this equipment. This contract was awarded after a complete and thorough examination had been made of the equipment proposed by the different hospital supply houses. Therefore, the commanding officer of the naval hospital, Norfolk, is assured of receiving articles that are manufactured from the highest grade of material, of excellent workmanship and built in accordance with the bureau's standard specifications; while, on the other hand, under the present system, a requisition is submitted to the bureau for the table and dressing cabinet with specifications drawn from descriptive matter obtained from various catalogs. The requisition is approved and goes through regular channels; the proposals are sent out by the purchasing pay officer and referred back to the commanding officer for recommendation. It is found that practically every bidder proposes an article similar to specifications. It is then necessary to accept the lowest bid; the articles are received, inspected and placed in use in the operating room. From general appearances it is the equipment desired. However, there is no way of knowing whether the equipment will stand up. The specifications called for high-grade baked enamel, but there is no assurance that it will not turn yellow within six months and chip off at the slightest jar. It looks strong and durable and is constructed of high-grade steel according to specifications (at least the contractor so stated). There is no way of testing it locally or substantiating the contractor's statement. Only a matter of time will determine whether it will become rickety and unsightly, or give good service as is hoped. In the case of the suggested system, analysis has been made of the enamel, steel construction and other attributes which would leave no doubt that the articles would be of standard high-grade material.

The commanding officer of the naval hospital, Puget Sound, Wash., asks for a good ambulance and a heavy truck with hoisting apparatus. The bureau approving the standardization desk considers the location, importance of local needs, roads and cars already on hand at Puget Sound, and orders the Safety Ambulance Company to ship one safety closed body, standard automobile ambulance at once to Puget Sound. He also orders the Packard Company to ship one type-B truck equipped with hoisting apparatus. This presupposes that the standardization officer has decided to standardize all medical department cars in some practicable manner, for instance, as follows:

AMBULANCES	Large closed car, National type.
	Large open car, National type.
	Medium closed car, Safety type.
	Medium open car, Safety type.
	Small closed car, Bull type.
	Small open car Bull type.

TRUCKS	Large, with hoisting apparatus, Alpha.
	Large, without hoisting apparatus, top (?).
	Medium, with hoisting apparatus, Beta.
	Medium without hoisting apparatus top (?) Beta.
	Small, with hoisting apparatus, Bull.
	Small, without hoisting apparatus top (?) Bull.

For special purposes, a special car will be sent after consultation with Yards and Docks.

At the Mare Island Naval Hospital there is a multiplicity of types of cars and makes. There are sixteen cars and eleven makes. It is believed that the bureau could, after consultation and cooperation with the Yards and Docks, decide on types and makes of cars to fill our requirements as detailed above. The obvious advantages would be:

1. Development of practical types.
2. Familiarity with individual cars.
3. Economy in purchase and upkeep.
4. Greater ease of repair and supply of spare parts.

The judgment of some one person must ultimately be final in such questions. How much better, therefore, it would be if such judgment combined approval of the bureau, knowledge of general requirements, of quality of workmanship, of value of material, of durability and record of past performances, of reliability of merchants, and the ability to drive a better bargain, rather than to accept the judgment of a technically untrained and perhaps easily influenced and thoughtless person. The result of the former may be confidently expected to give a standard and well made, practical and durable article, while the latter tends to give our stations generally a heterogeneous collection of inferior equipment. The "next commanding officer" often regards the purchases of his predecessors as "hideous," "junk," and often forcibly and audibly wonders why this monstrosity was bought. He would be more patient and he would endeavor to utilize an article purchased by the bureau in which he had confidence and knowing that other commanding officers were contented with it. Should the standardizing desk make an error the various commanding officers and others should, and probably would, speedily give their opinion, thus constituting a practical check on the fallibility of "one man power."

We accept gratefully the articles on the supply table; little unfavorable comment is heard. Perhaps the fluid extract of ergot or zinc oxide or some other article is criticised, but we all know that in the long run we could not obtain such uniform, standard and satisfactory supplies and that we are saved an immense amount of bother. The principle governing standardization and uniformity accepted here, it is believed applies with equal force to our other general service requirements.

Local conditions and especial necessities will always demand a certain amount of nonstandard equipment and expedients, but it is maintained that these requirements need not necessarily be large. The standardization desk would be in the position to give the best advice obtainable on all matériel.

A CASE OF FOREIGN BODY IN THE LUNG

By Lieutenant WORTHINGTON SEATON RUSSELL
Medical Corps, U. S. N. R. F.

(With three illustrations)

History.—Miss C., a nurse, age 29, on duty at the U. S. Naval Hospital, New York, N. Y., gives the following history: About eleven years ago she was lying in bed endeavoring to remove a temporary dressing in a tooth by means of the pin of a barrette or bar pin, when she was seized with a sudden attack of sneezing. During the spasmodic inspiration the barrette was aspirated into the lung.

An X-ray examination made at the time showed the pin lodged in a bronchus of the right lung near the base.

A number of attempts were made to remove the pin by means of the bronchoscope, but they were unsuccessful, and the patient finally refused further attempts at removal, as the presence of the foreign body produced little trouble.

During the intervening years the nurse pursued her vocation without any discomfort from the presence of the pin.

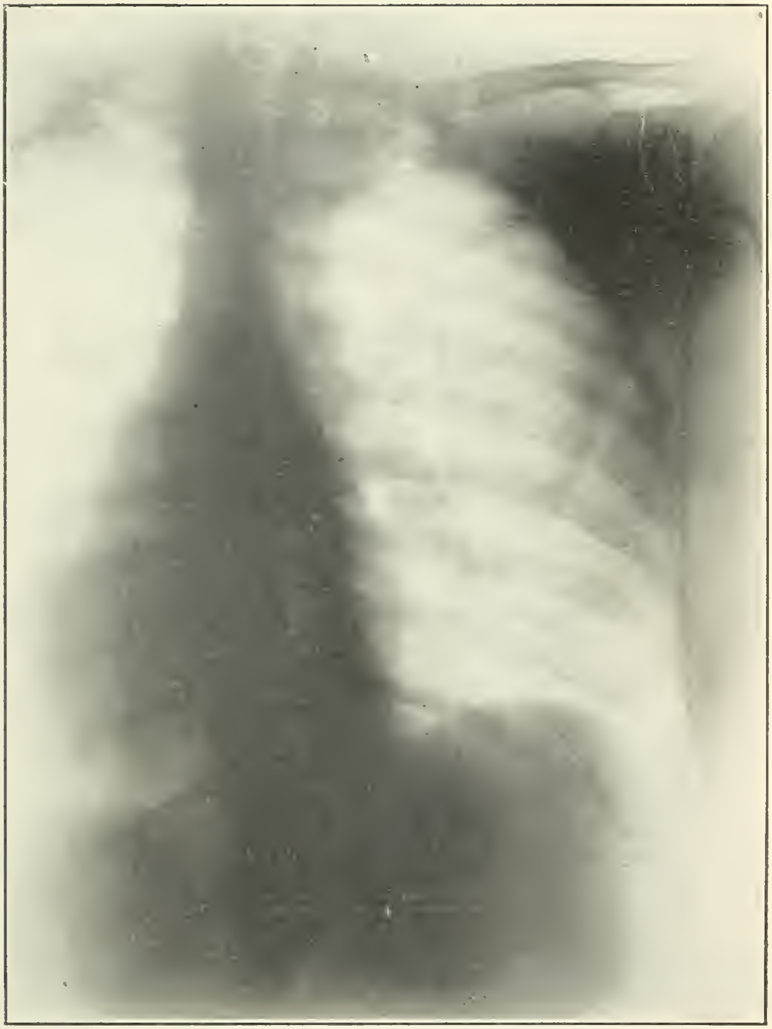
During May, 1918, while on duty at the hospital, she began to cough and raise a quantity of blood-stained mucus, and was referred to the X-ray department for examination on May 22.

The radiographs show a bar pin about 1⅛ inches long and one-quarter of an inch wide, with the pin wide open, pointing upward, lying in a bronchus at the posterior and outer side of the base of the right lung. The patient states that the position has changed since the last plates were made—it lies nearer the base and the pin has opened further. There is no evidence of any pathologic change in the tissue about the pin; therefore, the conclusion is reached that the blood in the expectoration has its source in some other part of the respiratory tract.

Remarks.—Cases in which foreign bodies have been inhaled into the lungs are very common, particularly among children, and all kinds of objects have been found, including tacks, pins, nails, coins, buttons, pills, candy, beans, pieces of food, etc., but the writer has found no record of the aspiration of a pin of this character.

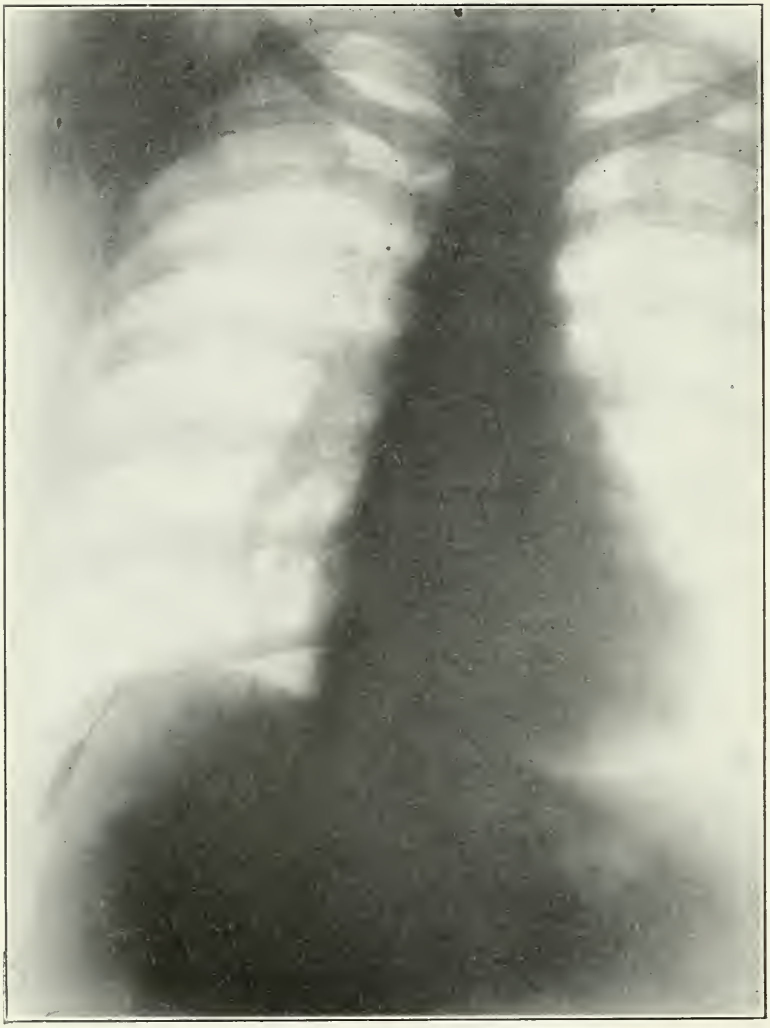
As in the present case, foreign bodies, if they pass into the lung, usually follow the right bronchus, owing to the fact that it is more nearly in line with the trachea than the left. Only 25 per cent of foreign bodies pass into the bronchi, the greater number being arrested in the trachea or larynx.

Cases have been reported in which a foreign body has remained in the lung without giving trouble for a number of years, one case as long

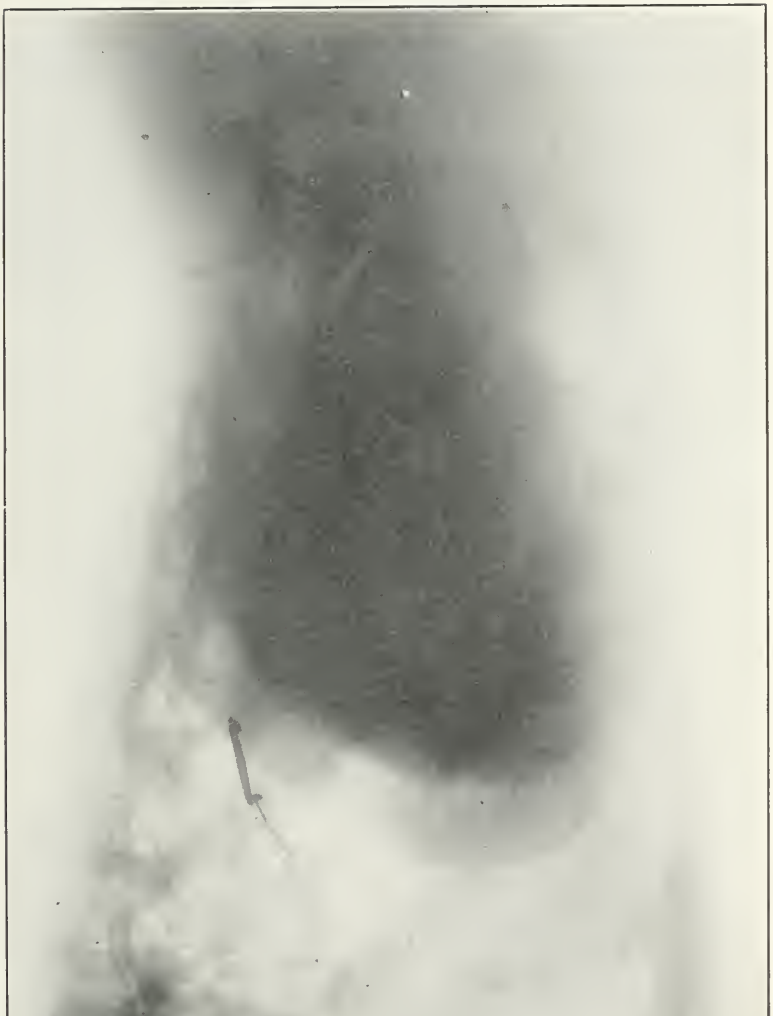


A case of foreign body in the lung.

(To face page 308.)



A case of foreign body in the lung.



A case of foreign body in the lung.

as sixty years, but these cases are rare. If the foreign body is not removed surgically it may be coughed up or it may result in necrosis of the cartilage of the bronchus with discharge through an external wound. If the body remains its presence causes serious pathologic changes, as ulceration or necrosis or infection may follow. If the body remains for a considerable length of time a fibrous capsule is formed about it.

The prognosis, unless the foreign body is removed, is unfavorable, as shown by von Brus, who reports a mortality of about 33 per cent taken from all available statistics. The deeper the body lies in the lung, the greater the mortality.

This case is remarkable because of the length of time, now over thirteen years, during which the pin has been lodged in the lung without producing any apparent change in the tissue surrounding it. The patient is still following nursing and complains of no trouble from the presence of the pin.

The radiographs show the pin from three different positions.

REPORT OF A MASTOID SERIES

By Lieutenant LEWIS G. JORDAN

Medical Corps, U. S. Navy

(With two illustrations)

THE purpose of this article is to report upon a series of very interesting mastoid cases operated upon at the U. S. Naval Hospital, New York, during the first five months of the current year. No attempt at elaborate detail is made. The desire is to summarize the work done, presenting at the same time a résumé of a few of the more spectacular cases.

In all there were twenty-four patients operated upon for a total of thirty operations. The initial twenty-four operations were simple mastoidectomies. The balance were distributed as follows: (*a*) secondary mastoids, three; (*b*) perisinous abscess with ulceration of the dura, one; (*c*) sinus thrombosis and excision of the jugular vein, both operations having been performed upon the same patient on separate days.

The immediate predisposing cause in each instance was a purulent middle ear inflamation of one of two types: an otitis media purulenta acuta, or an acute exacerbation of an otitis media purulenta chronica. In those cases following an O. M. P. A. the etiological factors, in so far as we have been able to determine, were as follows:

	Cases.
(*a*) Acute follicular tonsillitis	4
(*b*) Sinusitis maxillary	3
ethmoidal	1
(*c*) Acute rhinitis	1
(*d*) Complication of submucous resection operation	2
(*e*) Influenza	2
(*f*) Exposure to weather	1
(*g*) Cause unknown—Tb. suspected	1
Total 15 cases.	

Where an acute exacerbation of an O. M. P. C. existed, the original etiological factors were distributed thus:

	Cases.
(*a*) Scarlet fever in childhood	3
(*b*) Measles in childhood	1
as adult	1
(*c*) Chronic nose and throat disease	2
(*d*) Cause unknown—O. M. P. C. since early childhood	1
Total 8 cases.	

The ages of the patients varied from 17 to 68, the majority, however, being between 20 and 30 years of age.

Nearly all the cases occurred during the months of January, February, and March, when very cold weather and much snow prevailed. During this period the total otitis media cases ran proportionately heavy.

In this series the elapsed time from the onset of the O. M. P. A. till mastoidectomy was performed varied from two to twenty days, or an average for sixteen cases of eight days. Though there was no sharp line of demarcation, these cases could be divided grossly into two types: (*a*) those in which the time from onset to operation varied between two and five days; (*b*) others where the same phase of the disease consumed an average time of twelve to fourteen days. The former group, comprising six patients, presented the following syndrome: The onset was sudden, associated with moderate to severe pain in the ear, a variable amount of mastoid tenderness and a temperature running from 100 to 104 degrees. Examination revealed a red and bulging tympanic membrane sometimes obscured by blebs on the drum itself or on the canal wall close-up. Myringotomy gave subjective relief, but, in spite of the drainage thus provided, acute mastoiditis developed within a few days. In the latter collection, numbering eight cases, the onset seemed much more gradual and associated with less pain. The temperature varied from normal to 102 degrees and mastoid tenderness was absent or much less noticeable at this time. The drum was at first hyperemic, myringotomy usually not being indicated for twenty-four or more hours later. Two cases did not type definitely in either group.

The acute exacerbations of O. M. P. C. subjects lasted from twenty-four to sixty-five days, and, in one instance, a year or more, before coming to operation. The course of the disease was uniformly milder from the subjective side and in only one of the eight cases was temperature a feature.

As mastoiditis is constantly associated with otitis media, it is difficult, in many instances, to determine what proportion of the syndrome presented is due to the mastoid involvement. In our experience the separate phenomena varied so markedly that no exact degree of an individual symptom or sign seemed to be pathognomonic. The only exception might be cited in the matter of fundus changes.

Pain was present in twenty cases and absent in four. The majority of the patients did not feature it very prominently, but complained mainly of a feeling of fullness and dull ache in the ear and mastoid region. A few suffered somewhat severe pain; notably those cases of rapid mastoid involvement. Tenderness on pressure over the mastoid was positive in most instances. However, the amount present varied widely, some patients attempting to conceal it in the hope of avoiding operation, and others exaggerating it. Temperature was inconstant, being present in about 50 per cent of our cases. When present it ranged from 99.5 to 102.5 degrees.

Sagging of the posterosuperior wall in the region of the tympanic membrane was present in each case. Discharge was present in all cases. In cases of rapid development it was usually of moderate amount and seropurulent. Where the mastoid involvement matured after several or more days, the discharge was frankly pus and the amount fluctuated widely. The only evidence of mastoiditis in one case was sagging of the posterosuperior wall and a very profuse discharge. Cultures showed the order of frequency with which the different in-

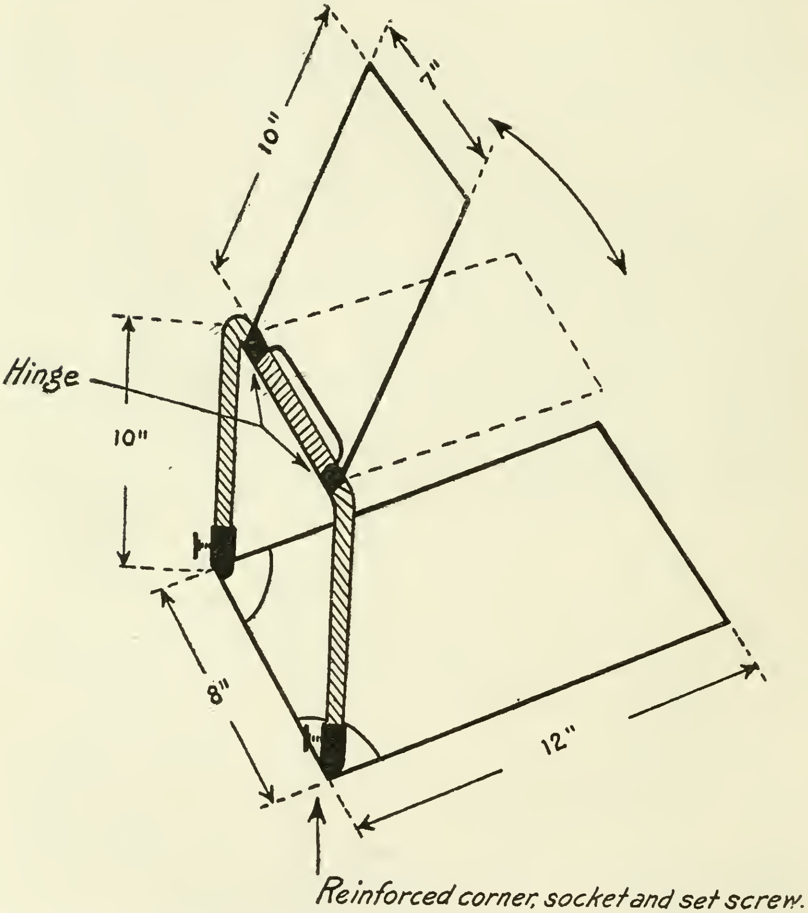


Fig. 1—Made from light Monel metal plate. Upper part detachable Upright made from small rod.

fecting organisms were discovered to be as follows: (*a*) streptococcus, (*b*) pneumococcus, (*c*) mixed, (*d*) staphylococcus.

Thickening over the mastoid was noted in two cases, in one of which a cortical perforation appeared at operation. External otitis was associated with two other cases and for a time obscured the diagnosis.

Blood counts did not indicate very much except in the sinus thrombosis and perisinous patients. Otherwise, the average count was about 9,000, with polys approximately 72 per cent.

The X-ray plates were uniformly excellent and in only one instance was there hesitancy in diagnosing mastoiditis.

Treatment in the otitis media phase of the disease consisted in early establishment and maintenance, in so far as possible, of adequate drainage. The patient was usually put in bed and a cathartic given. At first, when the discharge was seropurulent, hot boric irrigations every three hours were ordered. When pus was discharging one of treatments "A," "B," or "C" was given three times a day.

Treatment "A."—(1) Instill peroxide of hydrogen in canal and leave for five minutes. (2) Irrigate canal with warm boric solution. (3) Dry canal with cotton on applicator. (4) In still *gtt.iii* of a 2 per cent solution of boric acid in 95 per cent alcohol.

Treatments "B" and "C" differ from "A" in that 75 and 50 per cent alcohol respectively are used. Each patient was examined daily.

When the diagnosis of mastoiditis was established, the patient was given routine preparation and a mastoidectomy performed under ether anesthesia. A darkened room and reflected light were found most satisfactory. The anesthetist was excluded from the field by means of a metal screen (see Fig. 1).

Benzene, tincture of iodine and alcohol were used in preparing the skin. The external canal was now packed with sterile gauze and the patient draped.

The ordinary postauricular incision was found sufficient except in two sinus thrombosis cases, where a secondary posterior incision was necessary to allow greater exposure. After exenteration of the mastoid cells and removal of the tip, all debris remaining was carefully removed, the cavity irrigated with hot saline and packed with sterile gauze during the insertion of the sutures.

We use the suture illustrated, considering it excellent in that it everts and accurately approximates the skin edges, acting at the same time as a retention suture. It also has the virtue of controlling superficial oozing. Silkworm gut is used (see Fig 2).

Only two or three sutures are inserted to close the upper half of the wound. Now the initial packing is removed, and iodoform gauze strip is inserted well up into the antrum, and the cavity lightly packed. Large outer dressing and bandage are then applied.

Operative complications occurred in several instances. In four cases the dura was exposed twice over the sinus and twice over the antrum. Two exposures were found at operation, while the others occurred during that time. In each instance, enough inner table was taken down to expose the dura for an area up to ½ inch. In another case, where a peculiarly highly placed and large antrum was encountered, the facial nerve was injured, leaving a left-sided facial paralysis. Under physiotherapeutic measures there was, for several weeks, no improvement. Suddenly, it seemed overnight, he regained partial control of his obicularis oris. Since then progressive improvement has been the order, and it is confidently expected that eventually a complete cure will ensue. A Bezold's mastoiditis occurred in one case.

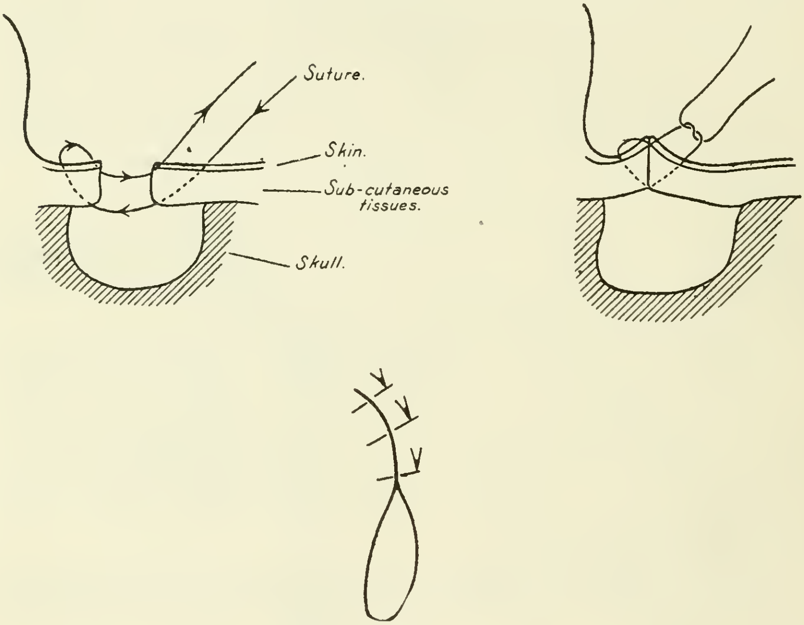


Fig. 2.

Certain sequela were encountered among the cases handled. In one case, where the dura was found exposed over the sinus, a perisinus abscess developed in conjunction with an ulcer on the dura itself. A secondary exploratory operation was necessary. Another case developed an abscess under the sternocleidomastoid muscle. It was incised and drained. Erysipelas developed in the site of the mastoid wound about three weeks after operation in a third case. An uneventful recovery ensued in eight to ten days. Septicemia occurred in three cases, two of which were fatal. Sinus thrombosis featured two fatal cases, in one of which a basillar meningitis developed. The temperature reactions after operation varied from normal to 104 degrees and lasted from two to ten days.

Postoperative care of the cases followed in the main a definite routine. The outer dressing was changed twenty-four and forty-eight hours after operation. On the fourth day a complete dressing was done in a strictly aseptic manner. The sutures were removed on the sixth day. On the following day he was dressed again and daily thereafter for about ten or twelve days. Subsequently the wound was dressed every two days, strict asepsis being maintained throughout. The results obtained were considered good. The time elapsing from operation to discharge varied from forty-two to ninety days, with an average of sixty days. Those cases taking the longer period were three cases where a secondary operation was necessary; one case, where tuberculosis was suspected as an etiological factor; one case, where a double mastoidectomy was performed, and finally a chronic mastoid upon whom a simple mastoidectomy had been done and where a necessary radical operation was refused. He was surveyed from the service. The cosmetic effect of the scars was reasonably good.

Functional tests were applied to each patient before discharge. The whispered voice, Politzer acumeter, and tuning forks were used routinely. Sixteen men recovered normal hearing. Four cases showed about 80 per cent recovery of hearing, three having been O. M. P. C. cases originally. One case, man of 68 years of age, regained 50 per cent. The last (survey case) had 40 per cent of normal hearing on discharge.

Case No. 1.—A——, R——, C. E., U. S. N., Age 22 years. White. Admitted January 3, 1920.

1–12—Submucous resection.

1–15—Tonsillitis, acute follicular.

1–19—Tonsils clean, nose in excellent shape.

1–20—Left ward without permission. Wearing sandals, pajamas, and bathrobe walked through snow and cold to and from pay office.

1–21—O. M. P. A. right ear. Paracentesis.

1–23—O. M. P. A. left ear. Paracentesis.

1–24—Right ear shows sagging posterosuperior wall and profuse seropurulent discharge. Temperature 102 degrees. Complains of pain in ear and tenderness on pressure over mastoid. X-ray indicates mastoiditis right side; left negative. Mastoidectomy right side. Culture.

1–26—Culture reported as streptococcus. Mastoiditis developed left side. X-ray positive. Typical symptoms. Mastoidectomy. Sinus exposed. Culture.

1–28—Culture left side reported streptococcus and diplobacilli.

2–7—Temperature normal. Progressing favorably.

2-13—Complains headache and pain left wound, in which granulations do not look healthy. No temperature.

2-18—Temperature last few days from 99 to 103 degrees. Secondary operation left side. Unhealthy granulations over sinus curretted away and sinus exposed for area of 1 inch, showing healthy dura on all sides.

2-23—Wounds both healing. Temperature 98.6 to 100 degrees.

2-25—Chill. T. 103-P110-R26. Lungs and abdomen negative. Blood culture. W. B. C. 16,000. Polys 80 per cent.

2-27—Headache, pain and stiffness in neck. Lumbar puncture negative.

2-28—Blood culture negative. Under ether left lateral sinus opened, mural clot removed, free bleeding each end. Blood culture.

2-31—Culture reported pure non-hemolytic streptococcus.

3-4—Temperature and chills continue. Under ether left jugular removed. Right mastoid about healed. Tonight rash on chest.

3-5—Culture reported pure streptococcus. Meningitis this a. m. Lumbar puncture positive (strep. present), and antistrep. serum given intradurally twice. Died respiratory failure this p. m.

Autopsy.—Basilar meningitis by direct extention from site of left lateral sinus.

Case No. 2.—H—— J——, Lieut., U. S. N. Age 55 years. White. Admitted May 11, 1920.

5-13—Submucous resection.

5-17—O. M. P. A. left side. Myringotomy.

5-24—T. P. R. normal. No pain or tenderness. Extremely profuse discharge and some sagging of posterosuperior wall of left ear. Gradually increasing deafness, no nystagmus or headache. X-ray positive.

5-25—Bezolds mastoiditis. Mastoidectomy under ether. Dura found exposed over antrum. T. P. R. normal.

5-28—Cervical abscess not draining well. W. B. C. 19,000. Polys 79 per cent. Lungs negative. T. P. R. normal.

6-2—Temperature 101 degrees this p. m. Brawny swelling of neck incised under ether and through and through drainage with mastoid wound established. Carrel-Dakin treatment instituted. Few rales both bases. W. B. C. 16,000. Polys 84 per cent.

6-6—Chill, temperature 104 degrees, and profuse sweat. Blood negative for maleria. W. B. C. 14,000. Polys 81 per cent. Blood culture taken.

6-8—Culture reported negative; another taken. Yesterday and today as above, but seems progressively weaker. Slightly delirious.

6-9—Drainage neck good. Albumin in urine. Bases both lungs conjested. Culture reported pure hemolytic streptococcus. Saw-tooth temperature continues.

6-10—Ninety c.c. of antistreptococcus vaccine given intravenously. No reaction. Patient in very weak condition, considered prohibitive operative risk.

6-12—Temperature normal since serum. Seems to show slight improvement. Serum repeated.

6-13—Chill and temperature of 102 degrees at 4 p. m. Became semicomatose. Marked conjestion both lungs. Vomiting and incontinent. Culture taken.

6-14—Temperature 99-103 degrees. As above, getting pulmonary edema also.

6-15—Died.

Autopsy.—Clot left lateral sinus. Hypostatic conjestion both lungs, with small pus pockets scattered throughout.

Case No. 3.—G—— W——, Fireman 3d class. Age 21 years. White. Admitted February 16, 1920.

3–3—O. M. P. A. right side. Myringotomy.

3–8—Very profuse discharge and sagging of the posterosuperior wall of the right ear. Some mastoid tenderness, but no pain complained of. X-ray positive.

3–10—Mastoidectomy under ether. Sinus found exposed.

3–12—Cough. Lungs negative. Temperature 103 degrees.

3–14—Temperature varies from 102 to 104 degrees. Lungs and abdomen negative. Wound does not look healthy; has foul discharge. Slight chill. Blood culture taken. W. B. C. 9,000. Polys 70 per cent.

3–16—Condition about same. Culture reported positive for long-chained streptococci (non-hemolytic).

3–17—Under ether anaesthesia secondary operation done. Perisinus abscess associated with ulceration on the dura over sinus. Bone removed till healthy dura was exposed on all sides. Ulcer curretted and touched with tr. iodine. Culture taken.

3–20—Second culture shows streptococci also. Temperature varies from 102 to 104 degrees. No improvement. Culture taken.

3–24—Culture negative. Temperature normal. Wound healing nicely.

3–30—Wound healing steadily. Temperature normal.

5–3—Tonsillectomy.

5–13—Mastoid wound healed. Hearing whispered voice, etc., 15/15.

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SUBSISTENCE OF PATIENTS AT NAVAL HOSPITALS AND THE COMMISSARY OFFICERS' FUNCTIONS

By Lieutenant F. FULTON
Medical Corps, United States Navy

THE old adage, "The way to a man's heart is through his stomach," has, according to humorists, been treated with considerable credulity throughout the ages by many designing mothers and acted upon by them in their campaigns to secure eligible sons-in-law. That many of the latter undergo disillusionment when they pass from the prospective state to the actual and find that what they had been led to believe was a sample of Gertrude's culinary effort was in reality a monument to Mamma's skill, and that Gertrude barely knew the difference between a flour sifter and a frying pan, does not deter others from "falling" for the same bait, nor does it detract from the truth the adage is supposed to convey, viz.: that man loves his "eats."

Although this truth is evidently recognized by the naval hospitals throughout the country, as attested by the growing importance of their commissary organizations, the following version of the adage itself probably has a more precise adaptation: "The way to a man's rapid convalescence is through his stomach."

To guard this responsive organ, in so far as patients at a naval hospital are concerned, against disappointment and to sacrifice in their cases none of the benefits implied by the adage as modified, devolves on the commissary officer of the hospital, who has direct supervision of all matters pertaining to the commissary department. Although his duties in this capacity are manifold, his paramount attention is given to the following particulars regarding the food served, viz.: choice, quality, variety, preparation, service, and quantity allowed each person.

Discussed separately and in order, the choice, with the exception of special cases, rests almost entirely with the above-mentioned officer. The menus for the general mess are prepared under his supervision, not only with due regard for the scientific principles of a balanced ration, but with a view to providing palatable, satisfying and sustaining meals.

A study of the full-ration menu in effect at the naval hospital, New York, for the week ending July 31, which is printed at the close of this article, will indicate that the proper proportions of protein, carbohydrates, and fats are not neglected and that roughage, or intestinal ballast, with its accompanying essential vitamines, is adequately provided for. In choosing vegetables, every effort is made to eliminate, so far as practicable, the use of the tinned product, especially where a suitable substitute may be found in available fresh season vegetables. Before these menus are put into effect they are submitted to the commanding officer of the hospital for his comment and approval. At this point it might not be amiss to observe that the successful commissary officer is he who welcomes criticisms and suggestions, not only from his commanding officer, but from any and all sources high or low. He must, however, possess a well-developed sense of discrimination and harbor a valid reason for acceptance or rejection of advice in matters pertaining to his department. The special, soft and liquid diet menus for individual cases are prepared under the direction of the chief nurse, in consultation with the hospital dietitian and the medical officers having charge of the respective cases.

Quality.—The quality of the food is the best that the market affords. Each item is covered by definite government specifications to this end. All deliveries are carefully inspected on receipt, either by an inspector of the Department of Agriculture or the commissary officer. In many cases by these two individuals, working in conjunction. It is therefore essential that the latter should be a good judge of food in its raw state. If, on inspection, it is found that the specifications are not strictly adhered to, the item is rejected.

Variety.—Menus are varied frequently and radically, in so far as the availability of different meats, fruits and vegetables will permit. The many ways of preparing each and the different combinations that may be employed both add to the variety and offer a guarantee against surfeit in respect to any particular component of the ration.

Preparation.—The commissary officer takes a personal pride in the proper preparation of the food. Since this necessarily depends largely on the kitchen personnel, it behooves the officer in question to assure himself as to the qualifications of each member. This he does by frequent visits to the kitchen, during which he samples food and observes operations. It is probably even more essential that he should be a good judge of cooked food than of raw, for he stands to win or lose the respect of the force in question by the intelligence he exhibits in this connection and to the extent that his criticisms are merited or unmerited. For the same reason he should be well versed in kitchen management; keen to discern and prompt to correct errors in operations, untidiness in the kitchen, its personnel or equipment, and lack of zeal on the part of any of the force. He not only impresses on the cooks that his instructions must be followed to the letter, but strives to inspire in them a loyalty that makes frequent admonitions unnecessary.

Service.—A meal which from a standpoint of choice, quality, variety and preparation might be considered ideal, is frequently spoiled when it finally reaches the consumer by imperfect service. The chief complaint n this connection in most establishments where large numbers are fed at one time is that the food which is intended to be eaten hot frequently reaches the diner at temperatures ranging from warm to cold. The mere contemplation of mashed potatoes and roast beef gravy, for instance, served cold is enough to stifle appetite for food even in a moderately hungry person. Another source of annoyance to a diner, and one that would be quite likely to have the foregoing effect, is to find evidences of previous meals adhering to his food containers and table equipment. That the messes at naval hospitals may plead "not guilty" as to either of these departures from good service may be credited in a large degree to the commissary officer and his staff. Unsparing effort is made to the end that all food containers, tables and their equipment are maintained in a scrupulously clean condition and that the persons serving the food are neat in appearance and manipulations. The food, furthermore, that is intended to be eaten hot, is served in that condition. As an additional safeguard to that end, the cafeteria system of serving has so increased in popularity among the naval hospitals that it is now employed at nearly all. Aside from the fact that this method of serving assures hot food, it has other features commending it. Before its adoption tables seating anywhere from sixteen to eighteen persons were furnished with meat platters and vegetable dishes, each containing about six to eight portions, respectively. It frequently transpired that the first man to help himself would possess, to use an old expression, "eyes larger than his stomach," and would greedily transfer to his own plate the entire contents of the platter or dish. This not only represented waste, since the larger part thus appropriated, which invariably remained uneaten when the man's appetite was satisfied, found its final resting place in the garbage can, but confusion resulted at the table while the others, who were entitled to a share from the amount originally serve, awaited a replenishment of the containers. This is obviated by the experienced server at the cafeteria counter who substitutes his judgment as to quantity required for the probably faulty judgment of the diner. The discussion now naturally drifts to the question of quantity.

Quantity.—The quantity of food for each person in the general mess is restricted only by his individual appetite. He is permitted to have as many services as he desires. This, of course, does not apply to special diet cases, where not only choice of food but quantity have a therapeutic significance, and both must be determined largely by the medical officer having charge of the respective cases. It does apply, however, to such accessories to a good meal as butter and sugar. These articles, even when they were highly difficult to obtain by the generel public as a result of war conditions, were always supplied to the patients at Naval hospitals in satisfying amounts.

ECONOMY IN THE COMMISSARY DEPARTMENT

The subject of economy, which has recently been most extensively and appropriately preached by many observers of present day excesses has at all times been urged by the Government on its various departments. The commissary officer is, therefore, expected to regulate the administration of his department accordingly. In doing so, however, he makes a distinction between economy and parsimony. The latter, where food is concerned, would invite wrath among those subsisted and in a hospital would retard recovery of the patients. For the latter reason it would represent the reverse of economy. As shown in the preceding paragraphs, economy is not invoked where quality and quantity of food are concerned. In the Commissary Department it has its principal application in the reduction of waste. Here, as before mentioned, the cafeteria system of serving merits its share of commendation, since it reduces waste in service alone by upwards of 25 per cent. The comparative results from surveys of garbage-can contents immediately following meals before and after adoption of the system is the best index to the correctness of the statement. The next great step toward economy is found in a scientific utilization of all uncontaminated left-overs from previous meals. The menu when prepared contemplates these and appropriate combinations are devised in which they are served with unqualified satisfaction to all concerned. The utilization of excess fats offers another good field for economy. These, under the direction of the commissary officer, are properly clarified and used for deep fat frying, shortening, etc., wherever it may be done to the exclusion of lard, which is now expensive, and without detriment to the article of food under preparation.

During the late war the naval hospitals throughout the country, expanded partly by permanent and partly by temporary structures, to many times their former capacities. Since all departments were represented in this expansion, the number of independent kitchens was necessarily increased. To the commissary officer it is a recognized fact, and one that will be readily conceded by any person interested in culinary activities, that three kitchens, cooking for a total of one thousand men, will have a total of approximately three times as much waste as would be the case if one kitchen cooked for the entire thousand. Following demobilization, the number of patients served by each kitchen has greatly decreased, thereby making it feasible to care for their subsistence with a limited number of kitchens. The working out of practicable schemes for effecting this concentration is a responsibility which the commissary officer has successfully assumed in the interests of the general campaign for economy.

THE COMMISSARY OFFICER

In the year 1898 a bill known as the Hospital Corps Reorganization Bill was presented to Congress and its passage effected. Among its provisions was one establishing for the first time a Warrant Officers' Branch in the Hospital Corps of the Navy. Officers appointed under this provision (originally only twenty-five in number) and carrying the title of naval pharmacist were chosen from the senior hospital stewards of the Navy (now rated as chief pharmacists' mates), who up to that time held the highest rating in the corps. By reason of the restriction in eligibility, viz.: length of service, the original appointees represented men whose experience in matters pertaining to the Medical Department was well rounded out.

These officers quickly demonstrated their fitness for the rank and by their interest in and efficient discharge of the duties assigned them have made the grade an almost indispensable adjunct to the Medical Department. Their duties, which have been clearly defined by the Bureau of Medicine and Surgery, include all that relate to the replenishment of supplies and the upkeep, expenditure and survey of property, correspondence and clerical work of the administrative office incident to the above, and instruction of the Hospital Corps. The supplies over which they have jurisdiction, which they order by requisition, receipt for and ultimately pass public bill for, range from an operating room scalpel to a boiler for the power house. The wide range of experience these duties entail points to the pharmacist as the logical man for selection as commissary officer, and it is from this branch that he is selected. One of the objects of this article is to convince those interested that he is the right man in the right place; that his constant endeavor is to make his department a model of excellence; that he takes an interest not only in his work but in the welfare and contentment of the patients, and in this way cooperates to the extent of his ability with the medical officers in expediting the recovery of the sick.

If this object has been attained the policy of the Bureau of Medicine and Surgery in selecting its commissary officers has not only been vindicated, but the reader will be inclined at this time, it is believed, to construct another version of the adage already referred to several times herein, which will read, "The way to the heart of a patient at a naval hospital is through his commissary officer."

FULL RATION MENU IN EFFECT AT NAVAL HOSPITAL, N. Y. FOR THE WEEK ENDING JULY 31ST.

	Monday	
Raspberries	Roast beef	Irish stew
Cereal	Brown potatoes	Cheese
Boiled eggs	String beans	Sliced tomatoes
Biscuits and butter	Watermelon	Bread and butter
Coffee	Bread and butter	Pineapple (fresh)
	Coffee	Iced tea
	Tuesday	
Fruit	Tomato soup	Cold meats
Ham omelette	Roast mutton	Potato and lettuce salad
Fried potatoes	Mashed potatoes	Bread and butter
Bread and butter	Fresh tomatoes	Cake
Coffee	Bread and butter	Iced tea
	Apple pie	
	Coffee	
	Wednesday	
Cantaloupe	Pot roast	Cold baked beans
Baked pork and beans	Boiled potatoes	Beef loaf
Tomato catsup	Mashed turnips	Cabbage salad
Bread and butter	Ice cream	Bread and apple butter
Coffee	Bread and butter	Lemonade
	Coffee	
	Thursday	
Oranges	Barley soup	Beef croquettes
Meat hash	Boiled ham and cabbage	French fried potatoes
Baked potatoes	Boiled potatoes	Bread and butter
Bread and butter	Pie	Peaches
Coffee	Bread and butter	Iced tea
	Coffee	
	Friday	
Stewed prunes	Clam chowder	Fish cakes
Bacon and eggs	Baked fish	Baked macaroni and cheese
Corn bread and butter	Tomato sauce	Bread and butter
Coffee	Mashed potatoes	Bananas
	Summer squash	Iced tea
	Bread and butter	
	Coffee	
	Saturday	
Cantaloupe	Barley soup	Beef steak
Fresh meat hash	Roast leg veal	Fried potatoes
Bread and butter	Dressing	Pineapple salad
Coffee	Creamed onions	Bread and butter
	Bread and butter	Iced tea
	Bread pudding	
	Coffee	
	Sunday	
Bananas	Vegetable soup	Assorted cold meats
Ham and eggs	Roast fowl	Potato salad
Bread and butter	Mashed potatoes	Bread and butter
Coffee	Buttered beets	Cheese
	Ice cream and cake	Bread pudding
	Coffee	Lemonade

REPORT OF A CASE OF RUPTURED URETHRA WITH FRACTURED PELVIS

By Lieutenant J. RICHARD ALLISON
Medical Corps, United States Navy

WHILE aboard the U.S.S. *Bridge*, a sailor 18 years old, fell through a hatch for a distance of two decks, sustaining an injury to the pelvis and the perineum. He was admitted to the U. S. Naval Hospital, New York, twenty-four hours later, with the diagnosis of rupture of the urethra. The patient complained of pain in the perineum, left groin, and of inability to pass water. He stated that several unsuccessful attempts had been made to pass a catheter and that he had not passed any urine since the accident. Examination showed the patient in a mild state of shock; temperature 99, pulse 104, respiration 18. There was no evidence of external injury except in the perineum which showed considerable swelling and edema with ecchymosis. There were pain and tenderness over this area, which were made worse by motion, especially of the left leg. Examination of the penis showed no evidence of urine or blood, and no abdominal signs or evidence of bladder rupture could be found. An X-ray was taken immediately which showed a fracture of the ascending ramus of the pubis in the upper third. No other evidence of injury was determined from the X-ray plate.

Operation for rupture of the urethra was decided on immediately. Under ether anesthesia an attempt was made to pass a sound into the bladder which was unsuccessful. The sound was passed as far as possible and held in the proper position while an incision was made into the perineum over the sound for a distance of 2 inches. A large blood clot with extravasation of urine and considerable laceration of tissue were found. After thoroughly cleaning out the wound the naked sound showed in the field for a distance of 3 or 4 inches revealing a complete rupture of membranous urethra, very near the inner layer of the triangular ligament. Examination of the bone showed a complete fracture of the ascending ramus of the pubis, with slightly comminuted edges. These latter were probably the cause of the rupture of the urethra. The next step in the operation was to find the proximal end of the urethra, and as this is the difficult step in the operation a careful search was made in the following manner: The whole wound was cleaned as thoroughly as possible and all the blood clots and pieces of lacerated tissue were removed. A point was then selected where it was thought the proximal end of the urethra should be, and where the most bleeding was seen. After the area was sponged dry, an assistant pressed on the bladder above while the operator watched carefully. Fortunately a few drops of urine were seen to appear in one spot, the operator immediately locating the point by catching a portion of the tissue with a pair of hemostats. It was then a simple matter to find the opening into the urethra and to pass a straight sound into the bladder. A soft rubber catheter was passed through the penis into the perineal wound, and from there guided to the proximal end of the urethra and into the bladder. The bleeding points were caught and ligated; the torn ends of the urethra were brought together and an attempt was made to suture them. The mucous membrane was caught up with fine hemostats and sutured with No. 0 catgut; the muscular coat sutured with ten day chronic, the wound packed lightly with iodoform gauze, and partly closed with three or four skin sutures.

The patient was returned to the ward in good general condition. He was placed on a Gatch frame in order to have a firm level bed without a sag in the middle. Sand bags were placed on either side of the left leg and hip to prevent motion, and in changing the bed care was taken in all instances not to cause any movement of the leg or pelvis. This was all that was done for the fracture at any time during the illness. A small suction apparatus was attached to the catheter to provide a means of keeping the bladder drained and at the same time to keep the urine from seeping along the outside of the catheter and into the perineal wound. This apparatus can easily be set up with three bottles, one filled with water, another acting as a vacuum, and a third to catch the urine.

When the gauze was removed on the third day the perineal wound was found to be infected and draining pus. At the same time the urine showed many pus cells. From the very beginning the bladder was irrigated every four hours with boric solution, but when the above infection was found the irrigations were increased to every two hours. The catheter was not allowed to remain occluded at any time and in this way the flow of urine followed the natural course and did not seep along the outside of the catheter into the perineal wound. The wound in the perineum was dressed twice daily and after the fifth day was irrigated twice daily with Dakin's solution. The infection proved to be a rather virulent one and did not begin to show improvement for two weeks, however the patient's condition continued to improve, and the wound in the perineum healed gradually. Under the frequently repeated bladder irrigations the urine showed remarkable improvement at the end of two weeks, the laboratory reporting only a few pus cells. The catheter was removed on the twenty-first day. By this time both the perineal wound and the bladder infection had practically healed.

During the twenty-one days that the catheter was in the urethra there was never a sign of urine in the perineal wound nor evidence of urine seeping along the outside of the catheter. After the catheter was removed the patient passed his urine normally, except that he was encouraged to pass it at more frequent intervals. On the second day after the removal of the catheter, the twenty-third day of the injury, an eighteen sound was passed without difficulty. Sounds were passed every other day until urethra admitted 24 F. After that sounds were passed weekly up to No. 28 F. As this seemed to be rather tight in the urethra a larger sound was not attempted. The twenty-eight sound was passed weekly for five months. The patient was kept flat on his back for eight weeks and then allowed to sit up in bed and soon after that to get out and bear a little weight on the left leg. No attempt was made to treat the fracture of the pelvis other than eight weeks rest in bed.

About three months after the accident the patient had erections and nocturnal emissions. This was an interesting fact since it showed the rapid restoration of all function and further proof of early healing if not primary union of the ruptured urethra. The patient was discharged to duty at the end of five months. Seven months after the operation he was requested to return to the hospital for a final examination. At this time he was examined with a McCarthy cystourethroscope under water dilitation and showed a very pretty picture of the site of the ruptured urethra at the membranous portion. Primary union had evidently taken place on the roof and sides where normal mucous membrane was seen. The floor of the urethra showed a scar that looked to be about ¼ inch long running in a diagonal direction. It did not have the appearance of scar-tissue but showed evidence of mucous membrane, strands of muscle tissue, and blood-vessel proliferation around the edges. This examination would lead one to believe that the final stage of this condition will be a complete covering of the floor as well as the side and the roof with normal mucous membrane.

This case has been written up in detail to offer a definite method of procedure. In reading the literature on rupture of the urethra one finds a variety of opinion as to the best course to pursue. Authors differ on the question of early operation—some surgeons advise suprapubic operation for drainage of the bladder and then waiting for an improved condition of the patient and a subsidence of the extravasation of blood and urine into the tissues at the site of the rupture. The dangers of delay in operation are—infiltration, decomposition of urine, infection, abscess formation, sloughing, sepsis and toxaemia. The dangers of such complications should be sufficient reasons for early operation. Furthermore it is a well-known fact that in the late operation it is far more difficult to find the proximal end of the urethra, and even when found it is often impossible to make the two ends meet because of the contracture of the tissue surrounding the urethra.

Another point in the discussion is whether or not a suprapubic should be done in connection with the perineal operation or if the latter alone is sufficient. The advocate of the suprapubic offer the following advantages for their procedure: Enables one to find the proximal end of the urethra; locates the exact place for the perineal incision; enables one to determine whether the bladder has been ruptured or not; shows whether or not any urine has extravasated into the peritoneal cavity.

The greatest difficulty experienced in the operation is locating the proximal end of the urethra. Very few operators claim that it can always be done, but those who have the most experience claim that it can be found without difficulty by carefully observing the following points:

(*a*) By performing an early operation, as stated above. The proximal end is a point where the most hemorrhage is seen, and in many cases a small artery of the urethra will be seen spurting.

(*b*) The point used in this case to find the urethra will seldom fail. Clean the wound thoroughly of all clots and dry as thoroughly as possible; then apply a sponge to the point where the urethra is most likely to be and as the sponge is removed have an assistant press on the bladder just above the symphysis pubis and a few drops of urine will be seen to appear in the field of operation. The operator should have a straight sound ready and pass it immediately into the bladder.

(*c*) Finger in the rectum on the lower pole of the prostate will indicate almost the exact location of the urethra and it is here that the search should be made and not over the whole field of the operation.

(*d*) Milking the prostate with the finger in the above position will often cause a flow of prostatic fluid into the field of operation.

It would seem reasonable to conclude that the operator who carefully cleans his field of operation, observes the above points and makes a diligent search for the proximal end of the urethra, will not have much difficulty in locating it. The failure of most surgeons has been undoubtedly due to a lack of systematic search. Too much stress cannot be laid on the importance of finding the proximal end of the urethra thus saving the suprapubic operation and retrograde catheterization. The latter carries with it a certain amount of danger and is being practiced less by men of experience. Retrograde catheterization has been used in genitourinary surgery since Virguin of Toulon, in 1757, performed the operation in a case in which the patient had retention even after perineal section. As stated above it is now used mainly to locate the proximal end of the urethra in complete rupture.

It is without doubt a sure method of procedure in such cases but it is not the operation of selection. Claim is made that it enables one to locate the exact point for the perineal incision. This, however, is not necessary for even in complete rupture a sound can be passed into the urethra as far as it will go and held in the proper position for a complete passage and the spot for the perineal incision will be definitely located.

It would seem that the important point in suprapubic operation is that it may tell whether there is a rupture of the bladder, and whether there has been extravasation of urine into the peritoneal cavity. There are, however, other means of determining the condition of the bladder. In the first place the abdominal examination of the patient before operation will usually show some signs of extravasation of urine into that cavity if present. Then when the catheter is passed into the bladder the recovery of clear urine in a fair quantity is pathognomonic of an intact bladder. The presence of a considerable amount of urine in the bladder even if blood tinged also justifies an expectant course. Finally there is a sure procedure which has often been condemned, but so far as has been reported, never caused any damage. Place in the bladder a pint of boric solution, and after an interval of time withdraw it, noting the difference in amount and if contaminated with blood. If a ruptured bladder is found then a suprapubic should be done. When urine is found in the prevesical space, the operation would be less difficult if a previous suprapubic has not been done for the retrograde catheterization. If there are intraperitoneal signs of fluid then the incision can be made higher up.

The question of suture of the torn ends of the urethra is advocated by some and condemned by others. It has been stated that when the catheter is in place the torn ends of the urethra lie together and therefore do not require suture; the majority opinion, however, is that the ends of the urethra will remain widely separated unless brought together by suture. This is especially true of those cases that have had the operation delayed for any length of time.

There are three distinct steps in the process of repair of the urethra granulation, condensation and absorption, and epithelization. We know that this repair process is very rapid, more so than any other part of the body; even so it would seem logical to conclude that the repair would be enhanced by close approximation of the mucous membrane and the surrounding structures. This is not advised with the idea that primary union in complete rupture of the urethra will always be obtained, for such cases are very rare, but it is known that the less area of granulation and scar tissue formed in the process of repair, the less tendency there is to the formation of a stricture, which, after all, is the important point in judging the prognosis of these cases. Statistics show the cases of primary union to be very rare. Nogues, Pasteu, and Iselin collected thirty-five cases of rupture of the urethra and in this number reported two cases of primary union. They stated that in all other cases either while the catheter was in place, or afterwards, urine was passed through the perineal wound; furthermore, they reported tight strictures in the majority of the cases that recovered. There is no way of telling whether or not the cases reported above as primary union were really true. That is, whether sometime after the operation a urethroscopic examination was made to determine the amount of scar tissue and loss of mucous membrane at the site of the rupture. In fact I have been unable to find reported in the literature any urethroscopic findings on postoperative ruptured urethras. This is an important fact since a definite knowledge of the end can only be determined in that way. A case that heals up without drainage of urine into the perineal wound is not necessarily one in which primary union has taken place. The case under discussion in this article is an instance in which one might have concluded that primary union had taken place, but on urethroscopic examination, it was found that while primary union had evidently taken place on the roof and the sides, for here was normal mucous membrane, there was considerable scar formation on the floor with absence of mucous membrane which was proof positive that this point had been the seat of infection and breaking down of tissue.

The postoperative care of these cases is very important and the success or failure of each case depends almost entirely on good or bad nursing. It is certain that the catheter can and should be left in the urethra until the wound at the site of the rupture has healed sufficiently to prevent the flow of urine into the perineal wound causing a fistula, thus delaying the recovery and increasing the possibility of a tight stricture as an afterresult. In this case the catheter was left in twenty-one days during which time it was never allowed to be occluded even for a short time. As stated in the beginning a mild suction apparatus was attached to the end of the catheter, and the bladder was irrigated at frequent intervals with a warm boric solution. A twenty c. c. syringe was used which forced any clots out of the catheter that tended to stop it up. In the very beginning the catheter was withdrawn so that the end just rested in the base of the bladder and each day the position was changed slightly so that it could not become incrusted in one place. Many operators report that the urine will invariably flow along the outside of the catheter and into the perineal wound. The reason for this is that either the catheter is stopped up or several inches of it are coiled up in the bladder thus increasing the resistance to the flow of the urine into the catheter. The tolerance of the urethra for a catheter over long periods of time and under adverse conditions was proved in this case. As stated in the history a violent infection was set up on the fifth day which later subsided completely with the catheter in the bladder. If this catheter had been taken out on the fifth day, as is the custom in these cases, there would have followed a perineal fistula of long duration, and in addition, a mass of scar tissue formed that would have undoubtedly produced a permanent and troublesome stricture.

The treatment of the complications depends, of course, upon the particular case and no set rule can be applied. If it is a fracture of the pelvis, complete rest in bed will suffice, in fact, the enforced rest may be a help instead of a hindrance in the treatment. It is not the intention of the writer of this paper to set this one case as an example to be followed by all, for it is realized that good surgical judgment is not derived from the results of one case. But in going over the literature on this subject rupture of the urethra was barely mentioned in the textbooks. The periodicals showed a comparatively few cases reported and even in those there was a wide divergence of opinion as to the best method of procedure. The procedure of what appeared to be the majority and the best opinion was followed out in this case except for one departure and that related to the time that the catheter should be left in the urethra after the operation. Taking all the facts into consideration and considering the results and the opinions of the best surgeons reporting on these cases the following summary of the proper procedure is offered:

1. When the diagnosis of rupture of the urethra has been made whether complicated by fracture of the pelvis, ruptured bladder or what not, a perineal section should be done immediately.
2. Suprapubic should not be done unless it has been found by examination that the bladder-wall is ruptured and that then only for repair of the bladder-wall.
3. Suprapubic should not be done merely for retrograde catheterization until the operator has failed after diligent search to find the proximal end of the urethra.
4. The torn ends of the urethra should be sutured with as good anatomical approximation as possible.
5. Catheter should be left in the urethra until the wound is healed sufficiently to prevent a perineal fistula.
6. The aftercare should always be considered the important point in obtaining good results.
7. Sounds should be passed two or three days after the catheter is removed, and then at intervals for a long period depending upon the nature of the stricture.

TYPES OF MOTOR AMBULANCES OBSERVED ABROAD[1]

By Captain F. L. PLEADWELL

Medical Corps, U. S. Navy

(With fourteen illustrations)

DURING a period of duty abroad in 1916–1917, I had an opportunity of seeing many types of ambulances. Many of these were inspected in England, some in France, and others in Italy, where they were operating under conditions of active service. As a result of the observations thus made, certain conclusions respecting ambulance design were arrived at, which I have endeavored to present in the following notes. An attempt has been made to indicate features of design which appeared to represent improvements over previous practice, and descriptions of several ambulances which combined a number of desirable points in both design and construction have been included.

The use of the motor-driven ambulance in the recent war made it possible for a wounded man to be carried to a fully equipped hospital within a few hours after receiving his wound. It is difficult to realize that a little over a hundred years ago the wounded were either carried to the rear by comrades or left unattended until the fighting was over. Our Civil War marked the beginning of the modern ambulance system and a similar system also played a great part in the Franco-Prussian War, but until the recent war the motor ambulance had not been extensively used on active service. In the South African War horse ambulances were used and were reported to be heavy, uncomfortable and so unwieldy as to be incapable often of keeping up with the troops.

The very great dependence placed upon the gasoline engine has been a most notable feature of the recent war, and to this device as embodied in the motor ambulance we owe a tremendous debt for securing the rapid and comfortable transport of the wounded. In former wars the surgeon could work without serious disturbance of his labors comparatively near the firing line, but in the recent conflict it was necessary to place the stations of elaborate surgical relief many miles behind the line in order to afford an even relative immunity from long range shell fire. Horse-drawn ambulances could no longer cover the distances imposed by modern war conditions, nor could they bring in the wounded within a reasonable time to a point where they might receive the necessary care.

In an ambulance journey from a front-line station to the rear the wounded man is necessarily subjected to certain adverse influences which a properly designed ambulance will help greatly to minimize.

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[1] Read at the annual meeting of the Association held at New Orleans, La., April 22, 23, 24, 1920.

If, for example, the design permits of easy and rapid loading and unloading of stretchers, has a spring suspension in the chassis suitable for the load to be carried and the road to be traversed, and affords the wounded full protection from cold and bad weather, then improved chances of recovery, as well as enhanced comfort, accrue to those being carried.

The most important requirement for the ideal ambulance is strength in every feature. It is true that during the war the light-car ambulance performed well in selected areas, but for active service on heavy roads, with capacity for full loads, the sturdily built car is essential. In the early days of the war, when the demand for ambulances was urgent, any touring car chassis was considered suitable for this purpose, but experience soon demonstrated that a chassis must be chosen with considerable care, having regard to the weight to be carried, the character of the surface to be covered and the comfort of the wounded. It is not sufficient to allow simply for the ordinary load of four stretcher cases and two drivers, for situations frequently arise where eight or ten patients have to be carried. This means a substantially built car, particularly in front and rear axles, an engine of large reserve power, and a spring suspension capable of receiving the maximum load without sacrificing comfort for the usual number carried. This latter requirement introduces a technical difficulty. Springs are commonly designed to work most efficiently when supporting their maximum load. If the capacity of the ambulance is ten "sitters," and the springs are designed accordingly, when the usual number of four lying-down cases is being carried, ease and comfort in riding qualities may be wanting. It is impracticable to overcome this difficulty entirely, but a spring adjustment for the average load, with a liberal margin of safety, allowing for the occasional heavier load by some auxiliary system of springs, which comes into action only when the maximum number is carried, offers the best solution. Shock absorbers, which retard violent rebound, as well as auxiliary coil springs, are of material value in this direction.

The double rear wheels frequently seen abroad have certain advantages, not the least of which is their ability to hold the road and their adaptability to varying conditions of road surface, particularly when they are shod with a steel-studded and plain tread, side by side. They have the disadvantage, however, of churning up more dust than single wheels.

A low compact body makes for less wind resistance, less swaying and fewer side slips on slippery surfaces, but it is essential to have sufficient ground clearance for the uneven surface of shell-pitted and

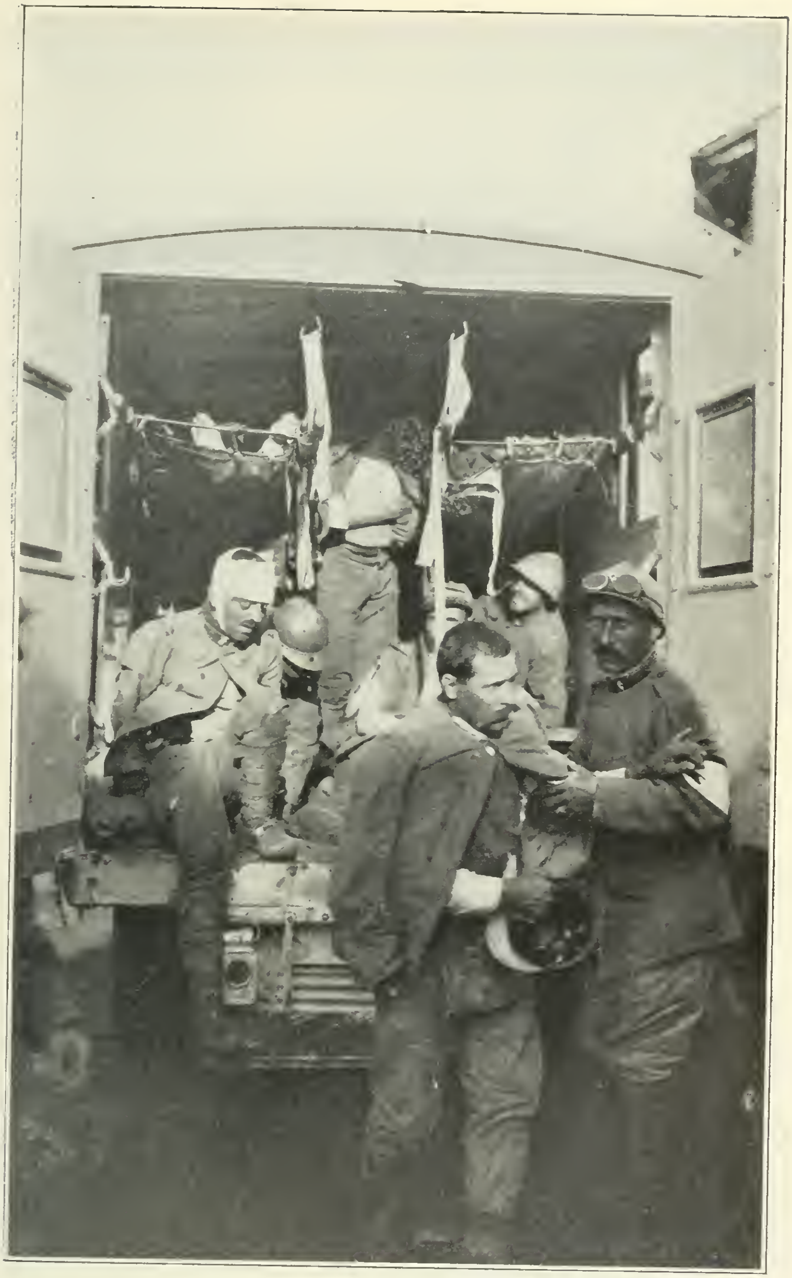

FIG. 1.—Wounded in an Italian Motor Ambulance at Doberdo.

(To face page 332.)

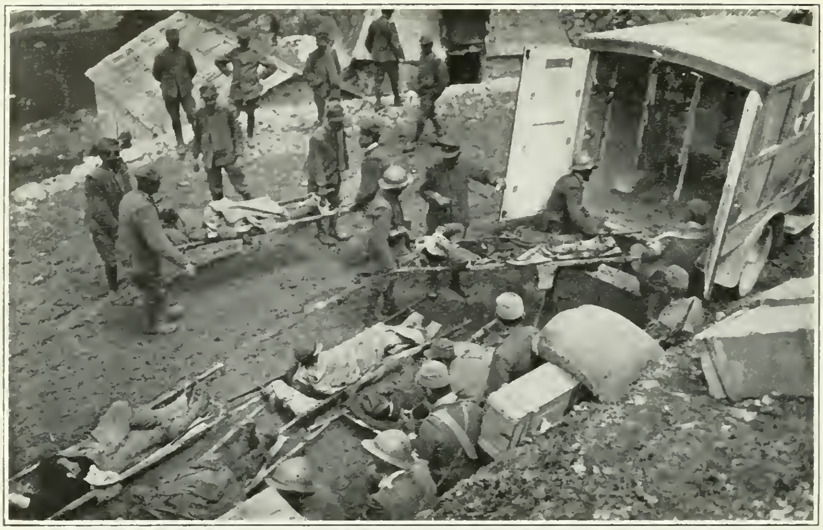

Fig. 2.—Loading wounded during action on the heights of Asiago.

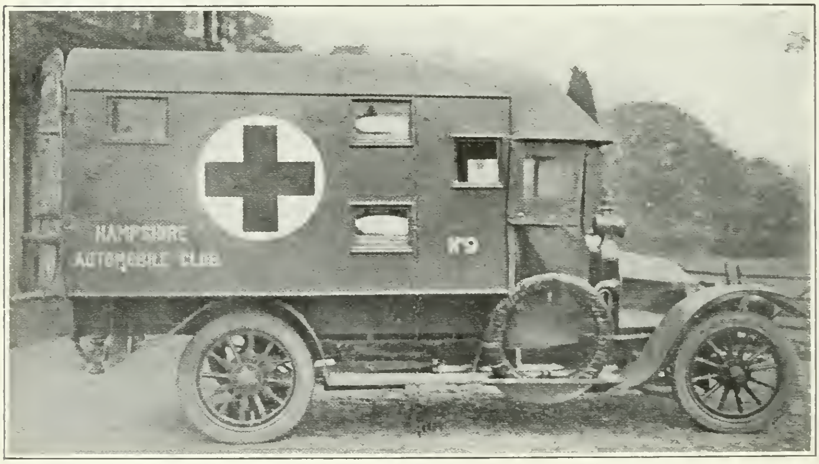

Fig. 3.—An exterior view of the ambulance, showing the smooth 3-ply wood side, canvas top, and Hopper windows. In this picture the step is folded up to form the tail-board. Note the complete protection given to the driver by the canvas cowl and side curtains, also the Hopper windows.

332

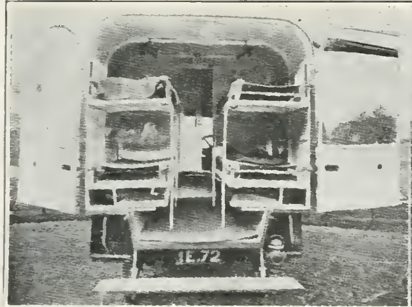

FIG. 4.

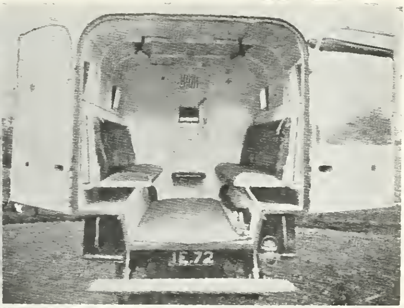

FIG. 5.

FIG. 4.—The interior with stretcher trays down and the door at the end of the gangway half open over the driver's seat. The folding seat for the orderly is shown raised near the door, and it should be noted how the curves of the seat and back padding fit into each other under the lower tray. On one of the doors the canvas is rolled, on the other unrolled.

FIG. 5.—In this view all the stretchers are folded and seats raised for sitting patients. The folded stretchers can be carried as shown on the floor or under the seats. The small red cross at the top right hand corner denotes the door of the medical locker. It will be seen that ample leg room is provided.

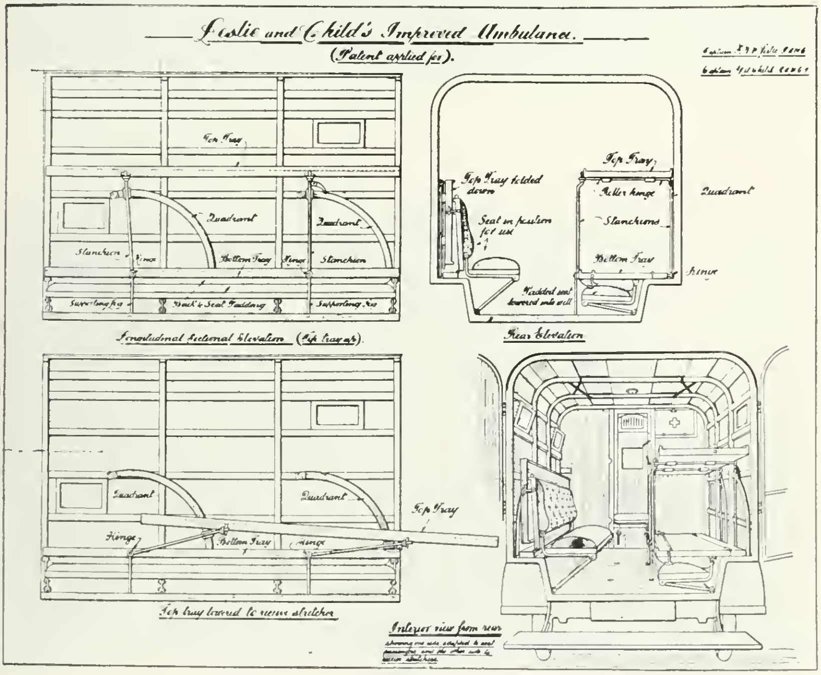

FIG. 6.

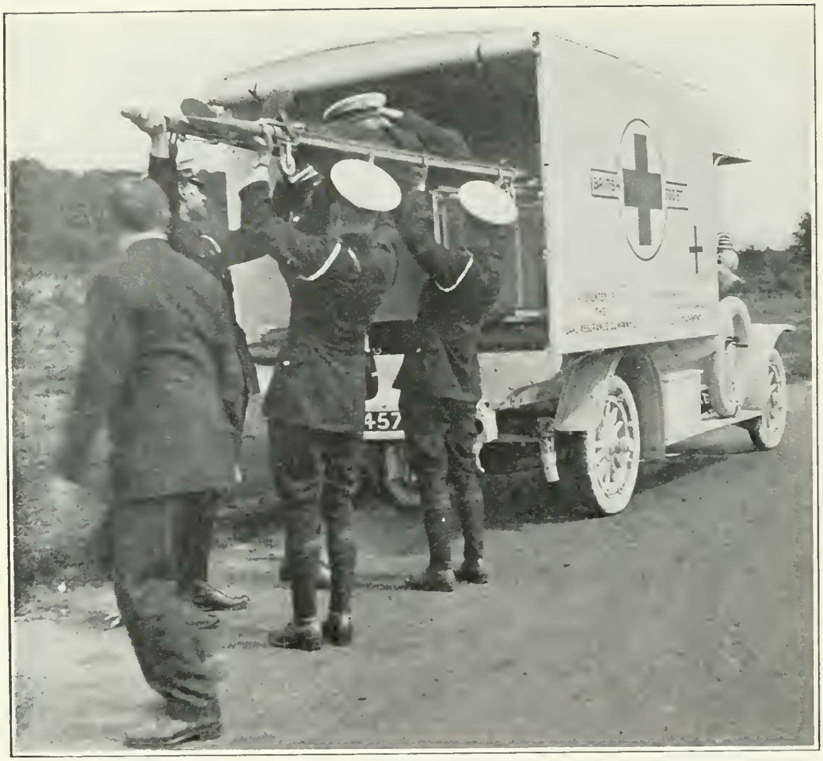

Fig. 7.—Loading the upper stretcher tray of an ambulance.

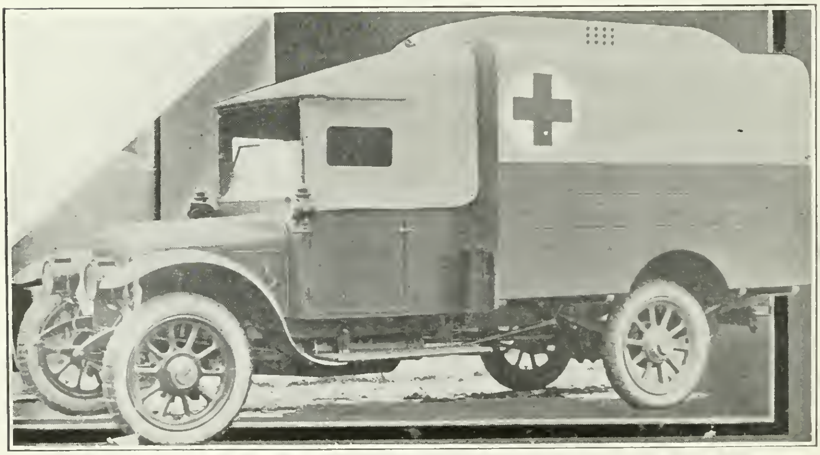

Fig. 8.

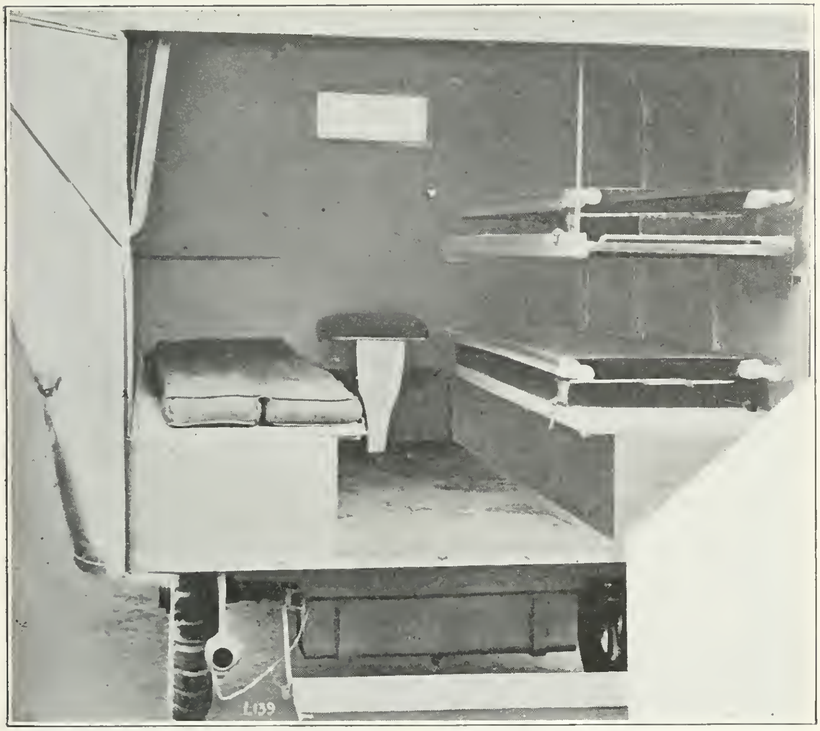

Fig. 9.

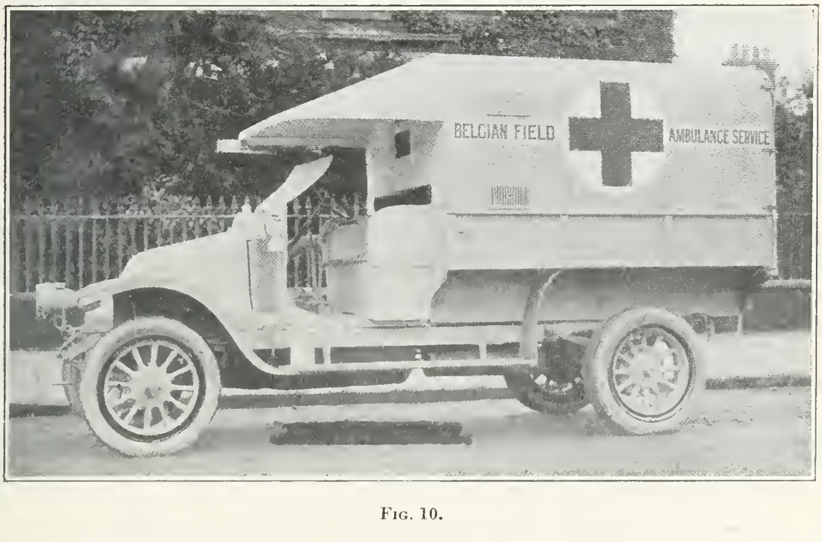

Fig. 10.

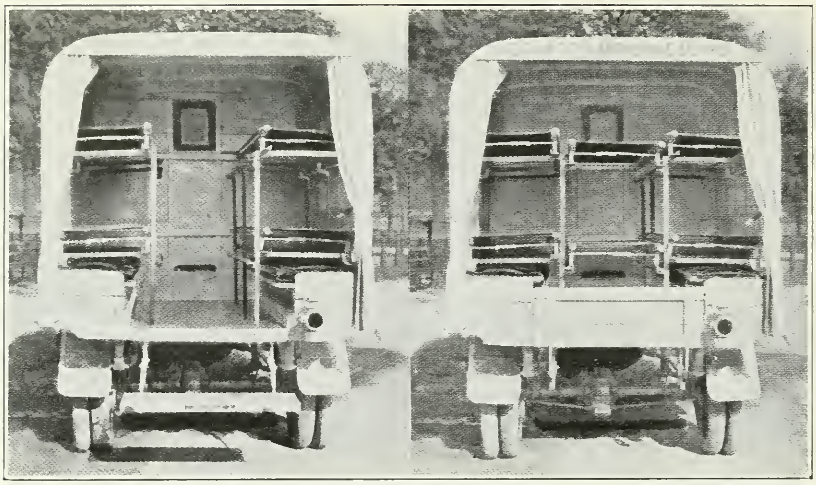

Fig. 11.

Interior of 20/30 and of 15.9 horsepower. 20/30 horsepower with extra stretchers adjusted.

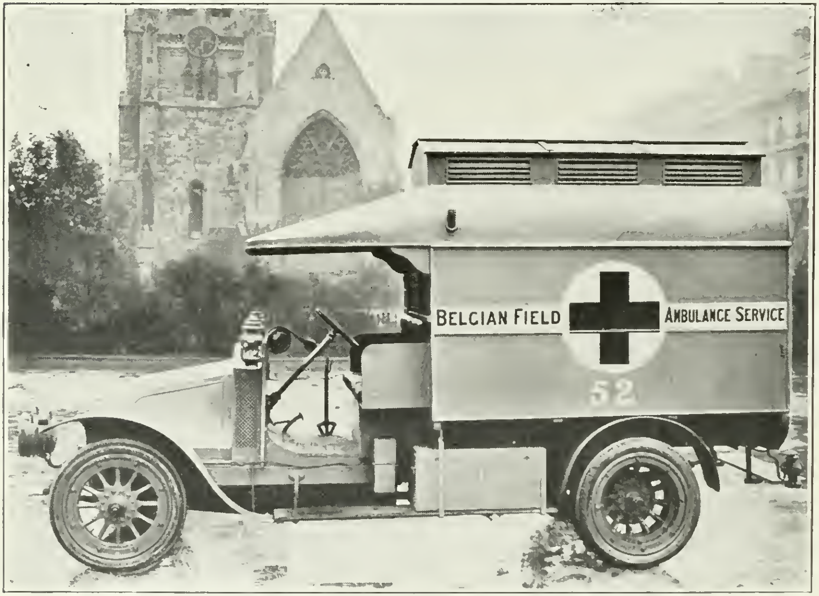

Fig 12.

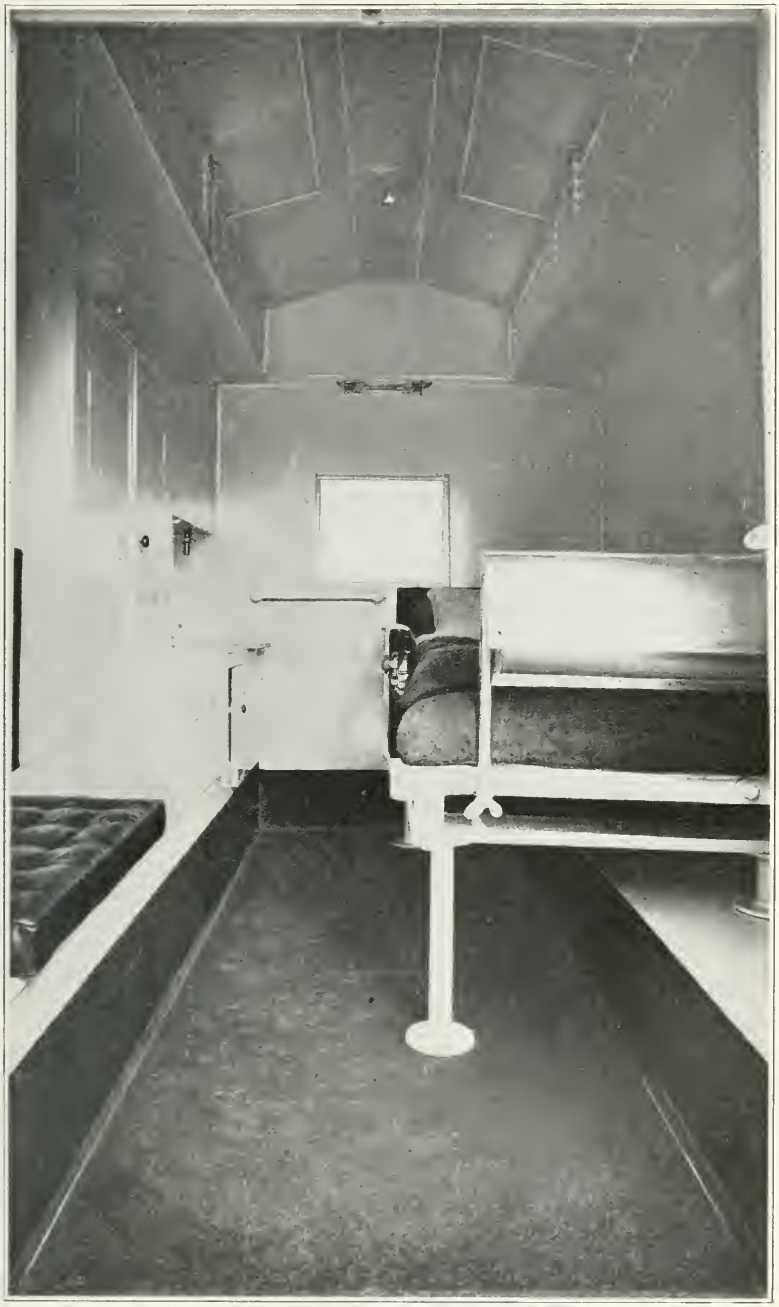

Fig. 13.

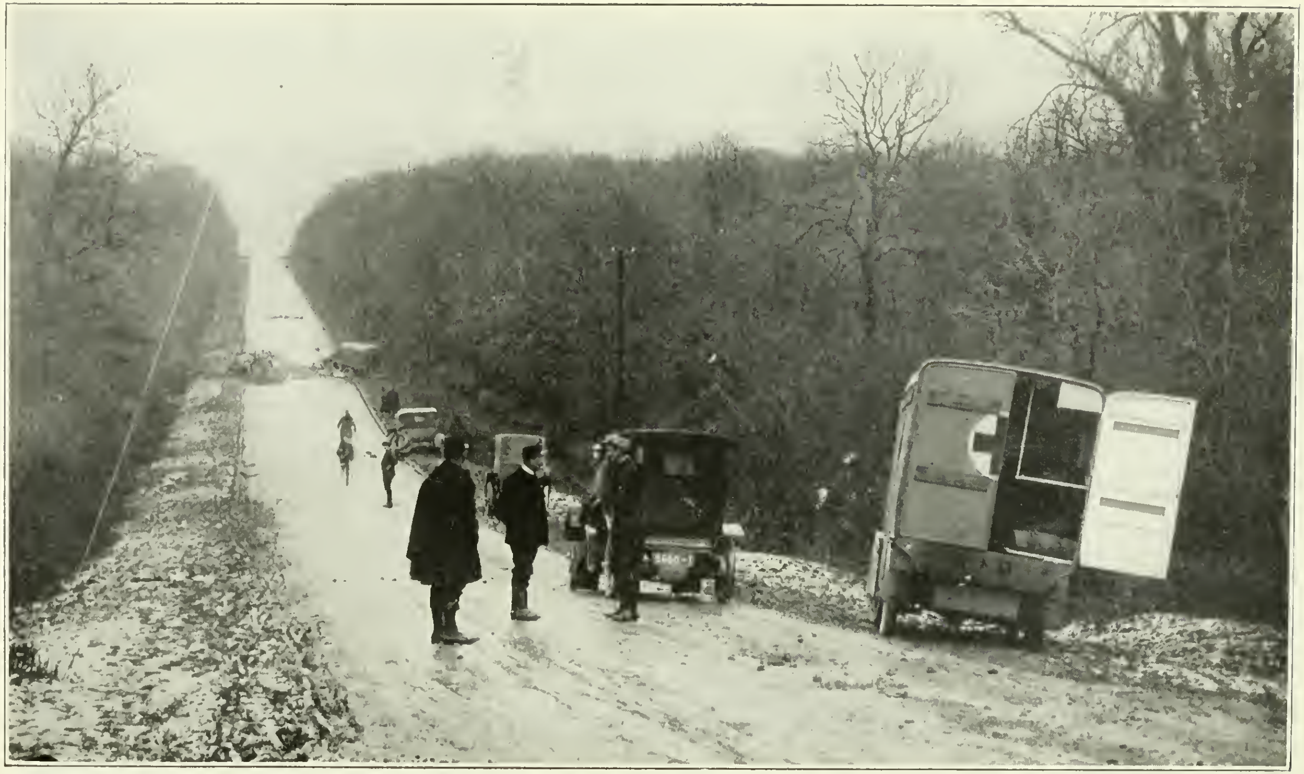

Fig. 14.—View of Roadway in France after a heavy frost. The use of chains is prohibited so that the only safeguard against skidding is the steel shod tires. How this device may fail on a road with an icy surface is shown in the illustration.

deeply rutted roads. Short overall length of chassis is desirable for easy maneuvering, but too short a wheel base tends to diminish easy-riding qualities.

Ease in loading and unloading an ambulance is very desirable, and hence in ambulances fitted with trays and slides it is important to have a proper adjustment between the stretcher legs and the runners or slides of the trays or racks designed to receive them. Occasionally one saw guides too narrow to receive the usual width of stretcher support. The guides or runners should be made wide enough to accommodate the extreme widths of stretcher legs likely to be encountered, and the runners themselves should be free of obstructions to smooth working, such as screw heads, etc. The stretcher racks should be mounted as low as possible in the car in order to facilitate loading.

Some French ambulances provide for suspension of stretchers on springs, but I have heard objections made to this system, it being alleged that a considerable vertical oscillation is set up in a stretcher thus suspended, which is of course detrimental to the comfort of the wounded. This arrangement also increases somewhat the time required for loading, over that necessary in ambulances fitted with the rack and slide system, which, under favorable conditions, should not exceed three to four minutes.

For work under fire or whenever speed of evacuation is desirable, quick loading is important. The type of ambulance which I saw on the Italian front in 1917, otherwise excellent, had this fault, that the elaborate method of sling suspension with which most of them were fitted involved the expenditure of a much longer period of time in loading than would be permissible under certain conditions of service where speed is essential. These Italian ambulances were of Fiat make, equal to climbing almost any gradient, a very important quality in the mountainous regions in which many of them had to operate, and had large, roomy bodies capable of taking six loaded stretchers. I was told that it was not easy to drive these ambulances slowly enough (on high gear) to secure to the wounded the maximum degree of comfort desirable with severe cases. Apart from the comfort of the wounded, slow progression, which is also noiseless, is important under some conditions of service, as near the front lines, where to go slowly without the necessity of a shift to the lower and noisier gear may be an important consideration. The Italian ambulance is shown in the accompanying illustrations (Figs. 1 and 2).

In ambulance construction a danger to be avoided is exposure of the wounded to cold. To those suffering from shock or hemorrhage cold is particularly injurious. This difficulty ambulance designers have attempted to meet in various ways. A limited heat radiating surface has been obtained by leading the exhaust gases from the engine through a system of piping arranged about the interior of the body of the ambulance.

In a field ambulance, destined for use in Belgium, which I saw in London, an electric heating apparatus was fitted.

As a rule the ambulance bodies seen abroad could be closed sufficiently to exclude cold and drafts, the air necessary for ventilation being admitted by way of ventilators or through windows constructed on the hopper principle, that is, only permitting the admission of air in an upward direction (see Figs. 5 and 6).

Side curtains on ambulances were rarely seen, and while a rear curtain was more common, the use of hinged doors for the rear opening was the arrangement usually adopted (see Figs. 1, 2, 4, and 5).

In an ambulance designed to transport sitting cases, a low-hung body is desirable as well as a strong, wide step at the rear. Any obstruction such as a fixed tailboard or any cross member is objectionable, in that it prevents easy access to the vehicle. A stout grab strap, by which a wounded man can pull himself up, is advantageous. Seats for sitting cases should not be too low and should be provided with cushions and a padded back rest. Any glass used in windows or windshields should be of the triplex or other nonsplintering variety.

The greater number of ambulances observed in active service on the British front had specially designed bodies calculated to withstand the heavy field and road service. A type ambulance generally embodied the following features: The walls were constructed of stout, three-ply wood, with seasoned wood rib supports for the top, the latter being of heavy waterproof material, securely fastened to the ribs with mouldings. A floor of hard oak or one covered with thick linoleum, the junction of floor with walls being cove finished to facilitate cleaning, represented the best practice. The interiors were usually finished in hard white water-resisting enamel but occasionally a lining of wooden panelling was seen. In many cars the hinged back step when raised and locked in position by spring locks, formed the tailboard of the ambulance.

Looking to the comfort of the driver, the driving seat should have a spring cushion covered with waterproof material, and this seat should hold two persons comfortably. Protection of the driver from dust, rain, snow, flying insects, etc., demands some sort of wind shield or screen. Early in the war glass shields were prohibited, owing to the danger and inconvenience from breakage and splintering, and a celluloid "roll-up" screen, with side aprons having celluloid windows was commonly seen. With the introduction of types of nonsplintering glass, the usual objection to glass was perhaps less valid but still held for ambulances used in areas exposed to shell fire.

From the driver's viewpoint, the set of the steering column and the resultant angle of the wheel are features of design worthy of careful consideration, for, if these are not properly adjusted with reference to the seat, comfortable driving is impossible. Likewise the brake and clutch pedals and the change gear lever should be placed where they are in full view of the driver and easily reached by the foot in the one instance and by the hand in the other.

For active service use in time of war, the carrying capacity of an ambulance is a feature of design deserving careful thought. Any ambulance that could not take four stretcher cases was looked upon as useless on the British front, and models were not unusual which could take six lying-down cases (see Fig. 11). Some of these were adaptable and could be changed quickly to carry a variable number of stretchers or a combination of stretchers and sitting cases. As an example, the Belgian field ambulance shown in Figs. 10 and 11 was capable of carrying: (1) Four stretchers with a passageway in the center and a seat for the attendant; (2) two stretcher cases and four sitting cases with a passageway in the center and a seat for the attendant; (3) six stretcher cases and no passageway; and (4) eight sitting cases, the stretcher fittings being hinged back against the sides.

In July, 1916, while on the Southampton Docks observing the landing of wounded from hospital ships arriving from France, I had an opportunity of inspecting an ambulance designed by Maj. R. W. D. Leslie, R. A. M. C., and Capt. G. A. Child, R. A. M. C. (T.), which presented many admirable features. Through the kindness of Major Leslie I am able to present the distinctive features of this ambulance and show the accompanying illustrations (Figs. 3–6). This ambulance was of the convertible gangway type, but the lowness of the seats which is a common fault in that type when arranged to carry "sitters," was ingeniously overcome by means of levers, which automatically raised the seats into position as the lower stretcher trays were folded back. This movement of the seats also permitted the well-shaped upholstered padding on the seats themselves, and on the undersides of the lower stretcher trays, to form comfortable lean-backs. Other features worthy of mention, which may be seen in the illustrations, included a communicating door forward, which folded back over the driver's seat and enabled the attendant to pass through to the interior of the car, and an arrangement of the upper stretcher trays so that they could be lowered to a level at which loading was greatly facilitated. This latter arrangement appears in Fig. 6. In ambulances fitted with the usual type of fixed upper stretcher tray, the loaded stretcher must be lifted well above the heads of the bearers, as shown in Fig. 7. In this ambulance, however, the upper tray when lowered comes to a position just above the lower tray, and, when loaded, it is pushed forward and upward into the elevated position, being held in place by a spring lock, as well as by a strap.

In Figs. 8 and 9 there is shown an ambulance which was inspected at a Corps Dressing Station near Bécourt, to the eastward of Albert, in October, 1916. This area had been for several weeks a very active one and ambulances there had been subjected to very hard and continuous service over extremely bad roads. Two of the ambulances of this make seen at this point had to their credit a mileage of some 14,000 miles since being sent out from England, and apparently they were still in good condition and capable of further service.

In November, 1916, in London, a special type of ambulance was seen, illustrations of which appear in Figs. 12 and 13. The idea of this ambulance originated with the Belgium surgeon, Colonel Dépage, who desired a means of transport for classes of wounded requiring special treatment and nursing care during the period of carriage from an advanced station for wounded to a base hospital. The body of this ambulance was constructed of light seasoned timber with mahogany panels, and strengthened with forged edge plates. It was fitted with a dome roof, with an additional corridor roof, the latter having ventilators and a hinged top. The roof was covered with moleskin secured by mouldings. Hinged doors with sliding windows were fitted at the back, the doors having an outside and inside handle and a spring lock. The back step was arranged to fold up on strong forged lock hinges. The front of the car was fitted with a sliding window for communication with the driver. The interior was lined and panelled, fitted with a long medicine cupboard and a bottle rack; a bandage, instrument and dressing locker; a water tank with filler and tap; an enameled wash basin with outlet pipe; a towel rack and a seat for the attendant. The cot was specially designed with rubber shock absorbers and padded sides, one of which was arranged to hinge down. The spring mattress was wool and hair filled, and had adjustable attachments with web guides and cross straps to hold the bed clothes in place. A web protector was fitted for covering the feet. Electricity from storage batteries was utilized for lighting and the Dowsing radiant heat apparatus supplied warmth. The whole of the interior was painted with washable white enamel and the floor covered with linoleum with rounded corners taken up to the seat edge to prevent dust lodgement.

To summarize, then, some of the essential features of an ambulance, as deduced from the foregoing observations, I should say that the ideal ambulance should take at least four stretchers, and be readily convertible for either ambulant or sitting cases, or both; permit of easy and rapid loading; possess a substantial body capable of withstanding hard service; have a motor of at least 20-horsepower capacity and with flexibility of power permitting of slow progression on the high gear; be fitted with the proper spring suspension for the loads to be carried; have the stretcher slides fitted for slight variations in widths of stretcher supports; afford complete protection of patients from weather and relatively good protection to driver and attendant; permit of easy cleaning of the floor and interior and be designed without obstructions at the rear opening which might retard prompt and easy loading and unloading.

For permission to reproduce the illustrations shown in Figs. 7 and 14, I am indebted to "Newspaper Illustrations, Ltd.," of London. The photographs from which the illustrations appearing in Figs. 1 and 2 were prepared were secured through the kindly offices of Captains Pirelli and Weilshotte at the Comando Supremo, Udine, Italy.

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SINGLE EXOSTOSIS OF LONG BONES

By Lieutenant PHILIP J. REEL, M. C., U. S. N. R. F.,[1] and Lieutenant CARL C. HUGGER, M. C., U. S. N. R. F.[2]

(With five illustrations)

IN DISCUSSING osteomata Ewing states that: "True progressive neoplasms which adhere to Virchow's criteria and in which bone is the essential and not the secondary or accidental product are not common, but chronic processes which result in bone formation from trauma, inflammation and disturbances of nutrition are numerous." Exostosis, while not in the strictest sense true osteomata, present sufficient neoplastic characteristics to render it rather difficult not to include them when discussing benign bony tumors. Since the advent of the X-ray these outgrowths have easily become the most frequent of bony tumor formations. Our interest in this subject was aroused after encountering five cases, while in the medical service of the U. S. Navy, four of which presented practically the same point of origin on the lower end of the shaft of the femur.

A review of the literature would seem to indicate that this type of single outgrowth presents a varied etiology and course. These masses are always periosteal in origin and when occurring as a single process have a tendency to spring from the shaft of long bones. The point of election in many instances would seem to be at or near the epiphyseal line. Three of the four cases involving the femur which came under our observation arose from the epicondylar ridge while the fourth originated a little higher, its base being approximately 4 inches above the articular surface. These tumor-like masses projecting from the surface of the bone are circumscribed and present a base which is intimately connected with the shaft. In some instances this base is broad and expanded while in others it simulates very closely a pedicle or neck-like formation. In general outline they may be globular or tubular and in some instances appear as sharp ragged outgrowths. One of our cases presented a broad base which suddenly became tubular, the outer end of which was surmounted by a spherical expansion. Another revealed a distinct neck lying between the attachment at the base and the expanded free portion, while yet another comprised a main protuberance, the surface of which was broken by smaller subenlargements. The case occurring as an exostosis of the upper inner extremity of the tibia presented a base, neck and expanded portion.

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[2] Brooklyn Naval Hospital.

In structure the exostosis may be identical with that of normal bone formation or vary between a hardened eburnated mass and one composed of soft spongy tissue encapsulated by a thin shell of periosteum. These softened porous masses may later on become solid. While in many instances exostosis occurring on the shafts of long bones are associated with disturbances of nutrition and present multiple lesions, the cases used as a basis for this discussion presented nothing other than a single lesion. Two of the patients not giving a distinct history of trauma had, however, every opportunity of sustaining an injury prior to their knowledge of the existence of the tumor. In the young, robust, healthy adult it is exceedingly difficult to arrive at a definite conclusion regarding the value of trauma as an exciting cause in the absence of a history of fracture or a blow that has resulted in an actual period of disability. Repeated injury of a mild form seems to have been a factor of some importance in most of the cases seen by us. Many of these outgrowths occur at the seat of a fracture involving excessive callous formation or in some instances follow a single trauma which has stripped a small portion of the periosteum from the shaft of the bone.

Clinically single exostosis of the shaft of long bones may or may not present some type of pain as an important symptom. This would seem to depend upon the size of the growth, the proximity to articulations, the relation to the course of a nerve, muscle or tendon and the liability to repeated irritation or injury. Undue muscular activity such as prolonged drilling and marching may produce a condition of stiffness, weakness or pain in the region of the growth, in a nearby joint or group of muscles. This complaint comprised the chief symptom in the series coming under our observation. This limitation of activity produced by increased muscular effort may only be noticed during the exercise while in the interim the patient is usually free from symptoms. When the mass is palpable it is rarely other than sensitive excepting after an acute trauma. In those patients having a knowledge of the presence of the exostosis for some time it is described as being stationary or at most very slow in its development.

X-ray examination reveals a bony outgrowth composed of varying densities, shapes and sizes. The exostosis may be identical in structure with the shaft of the bone or differ materially in that it is densely eburnated or spongy, coarse and reticular. As stated above the base may be broad or narrow. The general outline may be symmetrical or present a neck-like constriction surmounted by an expansion varying in size, shape and consistency.

The following is a brief résumé of the five cases coming under our observation:

Case 1.—C. W., male, age 21 years, sent to the hospital complaining of pain, weakness and tenderness of right knee during and for a short time after drill. Ordinary muscular activities were free from symptoms. No history of trauma. Examination revealed a slight reddening over the inner aspect of the knee and a small hard nodular mass was palpable. This was slightly tender. X-ray examination reveals a bony spine arising from the inner aspect of the epicondylar ridge projecting upward and backward. It is attached by a broad base 2 inches in extent tapering gradually to a spine ½ inch in diameter by 1½ inches long surmounted by a small spherical mass. The base and spine are dense bone while the expanded extremity is reticular.

Case 2.—U. B. T., male, age 19 years, sent to hospital because of pain and stiffness in right knee. This seems to be more pronounced when in the reclining posture. States that one and one-half years ago while handling express the inner side of the knee was struck by a box. This contusion resulted in a period of acute lameness which lasted three months, after which time the condition entirely subsided. About three months prior to being admitted into the hospital he began having pain and stiffness when lying down. This has persisted. The family history reveals that his mother had a similar growth removed from the anterior aspect of the lower extremity of the femur. X-ray examination reveals a bony mass originating from the inner aspect of the epicondylar line of the right femur. It is attached by a short conical base 1½ inches in extent. Projecting outward and backward from the base is a small irregular reticular mass.

Case 3.—J. P. O'B., male, age 24 years, sent to the hospital because of a palpable mass which is sensitive, just above the right knee. About five years ago when delivering milk he noticed a slight tenderness above the right knee and upon examination discovered the lump. It was never painful and at no time interfered with his work. During the past five years the patient has been subject to the possibility of receiving numerous mild injuries in this region. Since discovery of the mass he states that in so far as he is able to determine it has remained the same size. X-ray examination reveals a bony projection arising from the epicondylar line 3 inches above the joint surface of the right femur. It points upward and backward. It is attached by a base one inch in diameter tapering slightly to a tip one-half inch thick. The structure is coarse reticular and does not resemble that of the point of origin.

Case 4.—E. W. G., male, age 24 years, sent to the hospital because of "weakness and soreness" of the right knee which occurs after drilling and the presence of a palpable mass. He states that six years ago he was struck with a ball bat on the lower end of the femur just above the knee. To his knowledge only the soft structures were contused. Shortly after this he noticed the presence of a lump which has continued to enlarge very gradually up until the present time. X-ray examination reveals a bony mass projecting from the right femur arising 4 inches above the joint surface. It is attached by a base 1½ inches in diameter tapering to a neck 1 inch across and thence to a globular mass 1½ inches long by 1 inch wide. The base and neck appear similar to the structure of the femur while the mass proper is coarsely reticular in density.

Case 5.—J. H. F., male, age 18 years, sent to the hospital because of a palpable tumor on the inner side and just below the joint of the left knee. He states that three years ago while in swimming he noticed an aching sensation in this region and upon examination discovered this lump. Up until the present time it has caused him but little trouble excepting when injured. X-ray examination reveals a bony projection arising from the inner aspect of the head of the tibia 1¾ inches from the

340

Case 1.—C. W.

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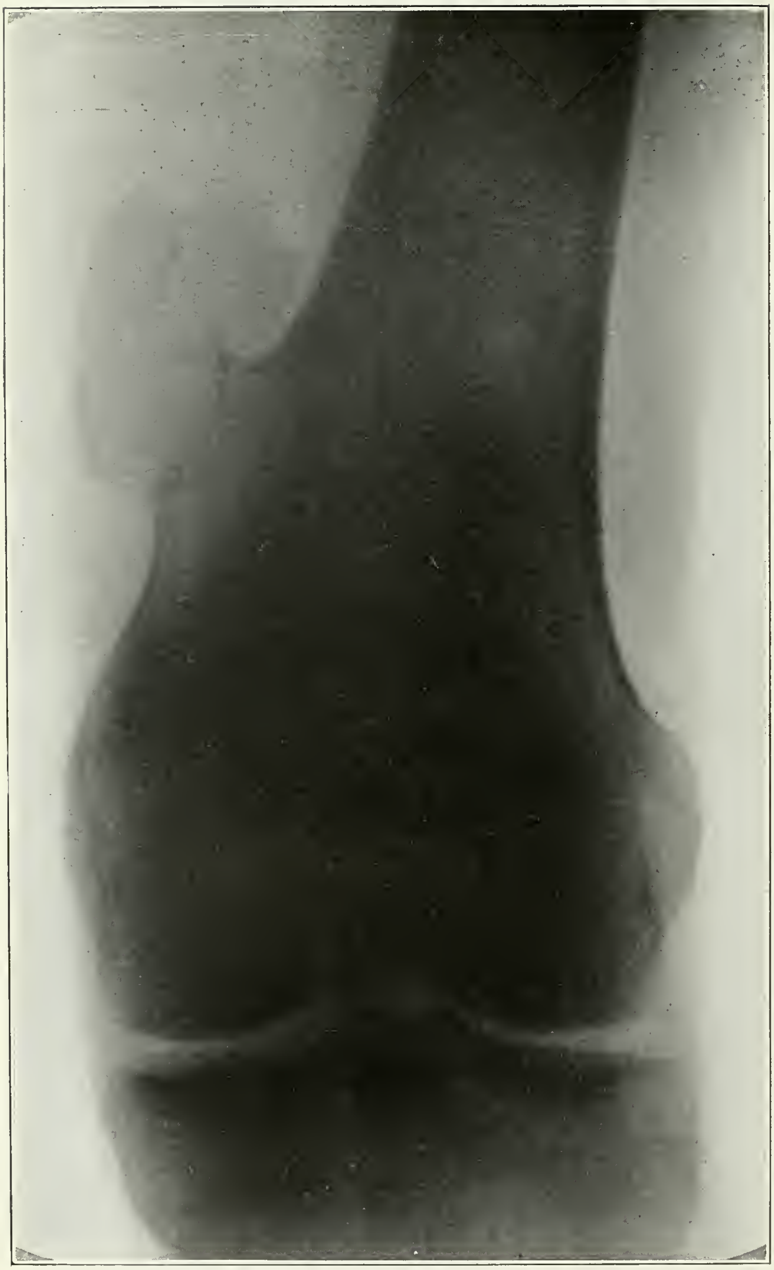
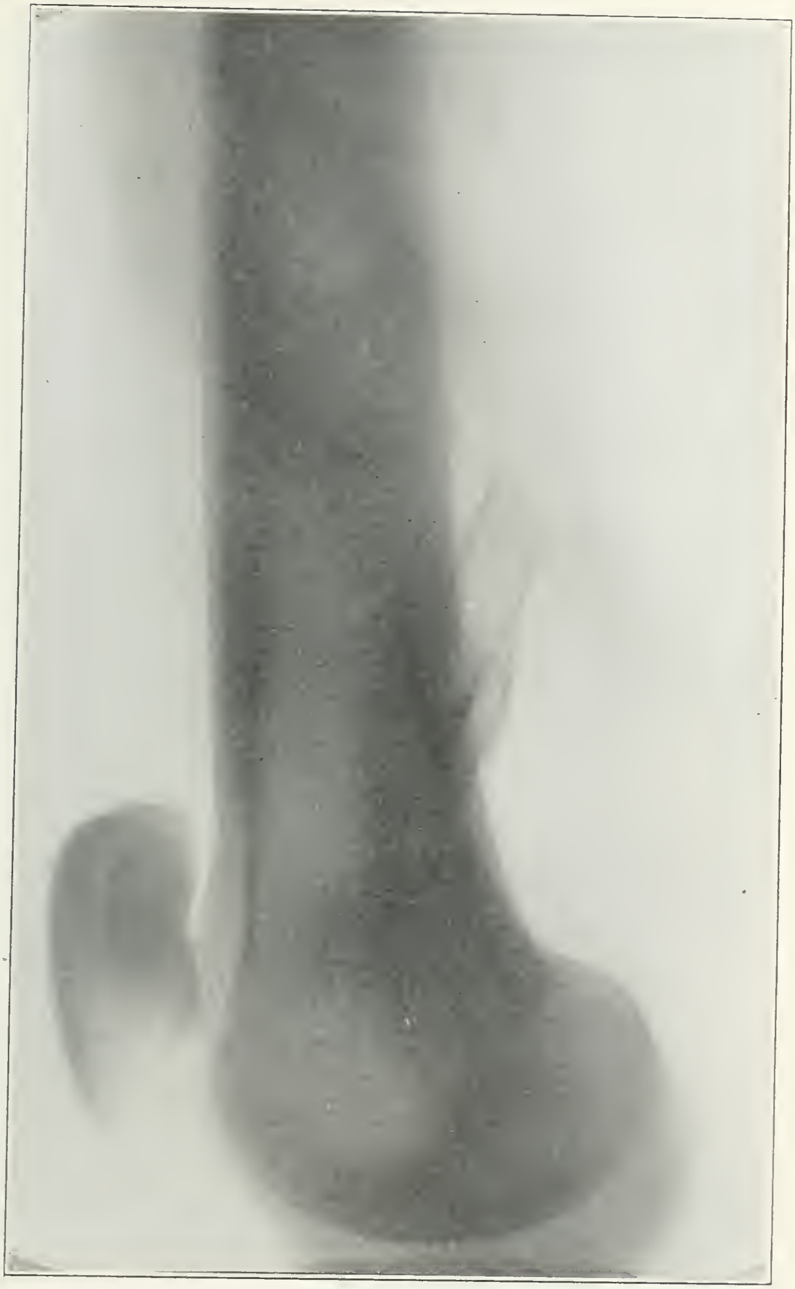
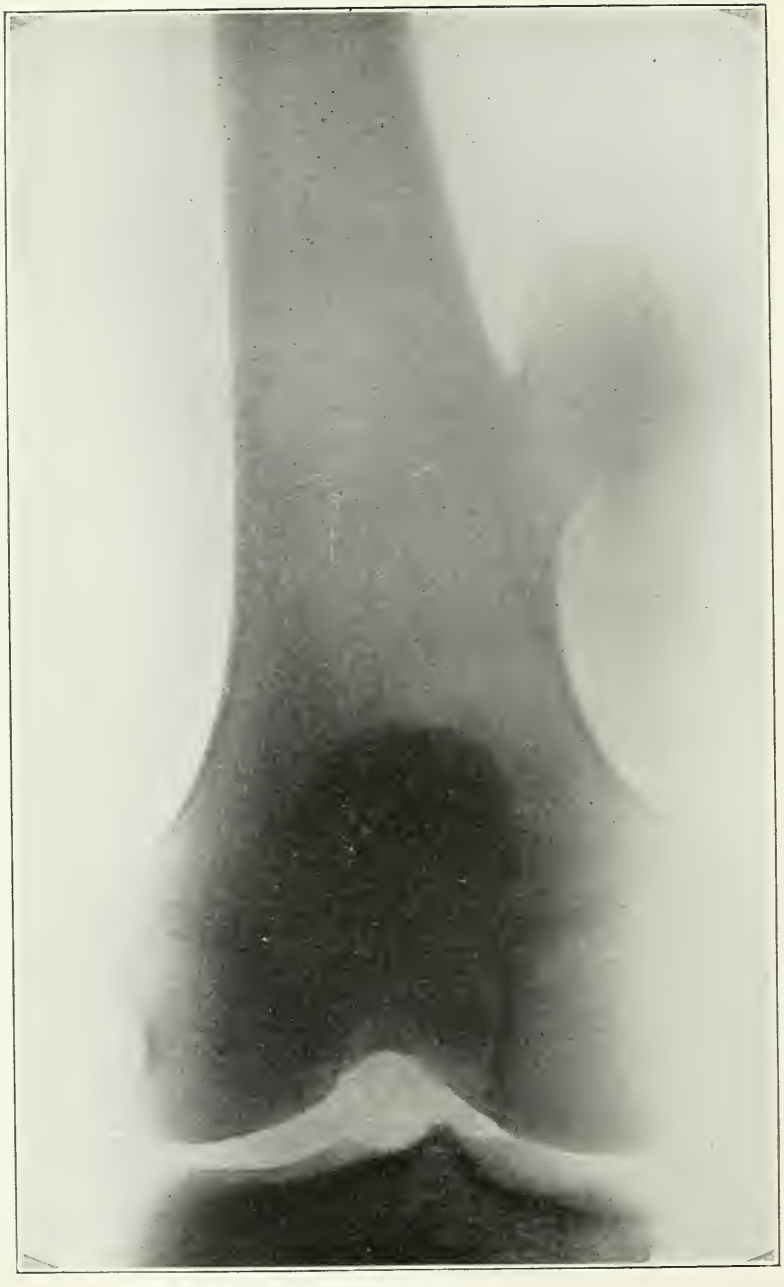


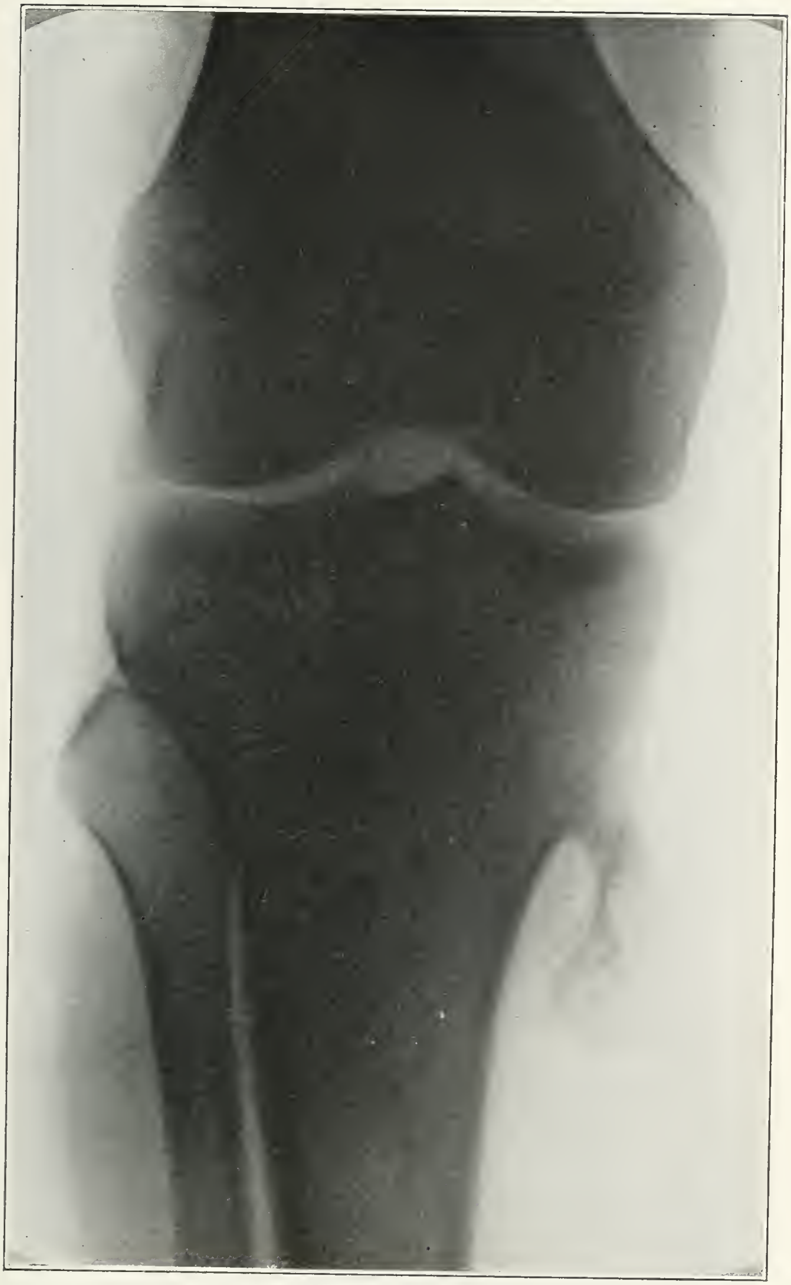
Case 2.—U. B. T



Case 3.—P. J. O'B.



Case 4.—E.W.G.



Case 5.—J. H. F.

joint surface and directed slightly posteror and downward. It is attached slightly posterior and downward. It is attached by a base ¾ inch in diameter tapering to a neck ½ inch across. The free extremity is surmounted by an expansion measuring ¾ by 1 inch. The base and neck resemble the tibia in structure while the mass proper is coarsely reticular.

The individual case determines the treatment. Should the exostosis be superficial and subject to repeated irritation or injury the possibility of sarcomatous change resulting therefrom must be recognized, and the outgrowth removed. Removal is also indicated when the tumor mass is found in such a position as to produce a mechanical derangement in the normal function of a joint, muscle or tendon. The same applies when the exostosis is encountered along the course of important nerves or blood-vessels and producing nervous or circulatory complications. When, however, the bony tumor is innocently situated, not being subject to trauma and causing no symptomatology, it can safely be left unmolested.

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FOUR CASES OF DERMATITIS EXFOLIATIVA FOLLOWING SALVARSAN ADMINISTRATION

By Lieutenant JULES MAGNETTE

Medical Corps, United States Navy

(With three illustrations)

SINCE 1918 the dermatological and G. U. service at the Naval Hospital, New York, N. Y., has had four admissions for dermatitis exfoliativa following salvarsan administration. Three of the cases developed while the patients were being treated at this hospital and one was returned from overseas. No known cause can be assigned for them except the personal idiocyncrasy of the patients so affected to the arsenic compound. The preparations used in the treatment can not be blamed because no serious results have been obtained from the giving of at least 8,000 doses.

The skin reactions described followed in all cases after the patients had received three or more doses. At the hospital here the salvarsan was given at weekly intervals although the case that was admitted from overseas gave a history of more frequent treatment.

The stage of the patient's disease seemed to bear no relation to the development of the condition. Two of the cases were in the secondary stage. One was a case of congenital lues and the other was a case found to have a positive blood test when routine Wassermann test was taken.

It is interesting to note that after reacting as they did all cases had negative blood tests.

The general symptoms were mild in three of the patients. One man reacted severely being in delirium and despite careful treatment and watchful nursing became pitiful from the loss of large areas of skin over the chest, abdomen and hip regions. His pulse, however, remained good at all times and his urine only once showed a trace of albumen though it was examined daily in the search for kidney involvement. Arsenic in small amounts was present in the urine. In every case the dermatitis was of the universal variety. Flushed face and hyperemia of the neck and upper chest were the first signs noticed in the development of the condition. Soon they became branny like mild scarlatina patients. In five to six days the exfoliative process commenced.

Next hyperemia began over the abdomen and extremities reaching the exfoliative stage in four to five days.

Treatment.—Salvarsan administration was stopped. The patients were put to bed, given catharsis and high warm colonic irrigations twice

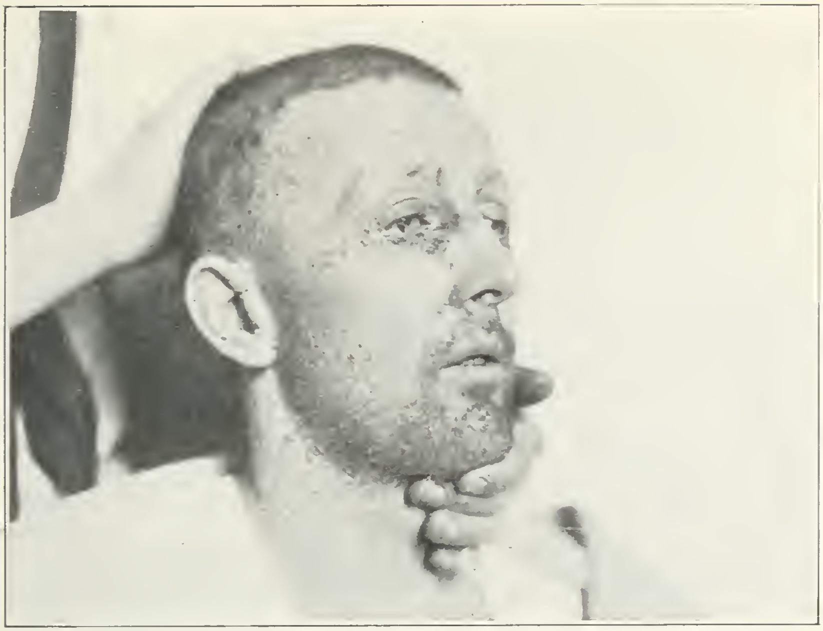

FIG. 1.—CASE 3.—Dermatitis Exfoliativa following Salvarsan.

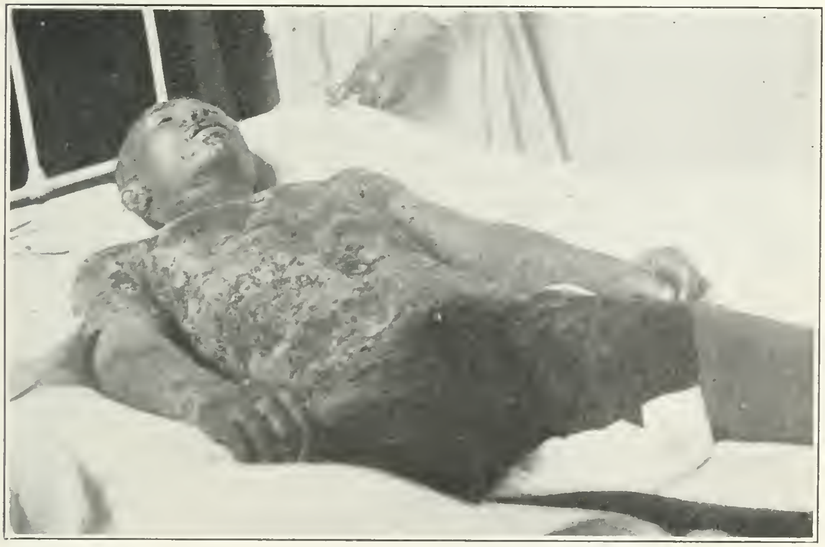

FIG. 2.—CASE 4.—Exfoliativa Dermatitis following Salvarsan (1½ weeks after).

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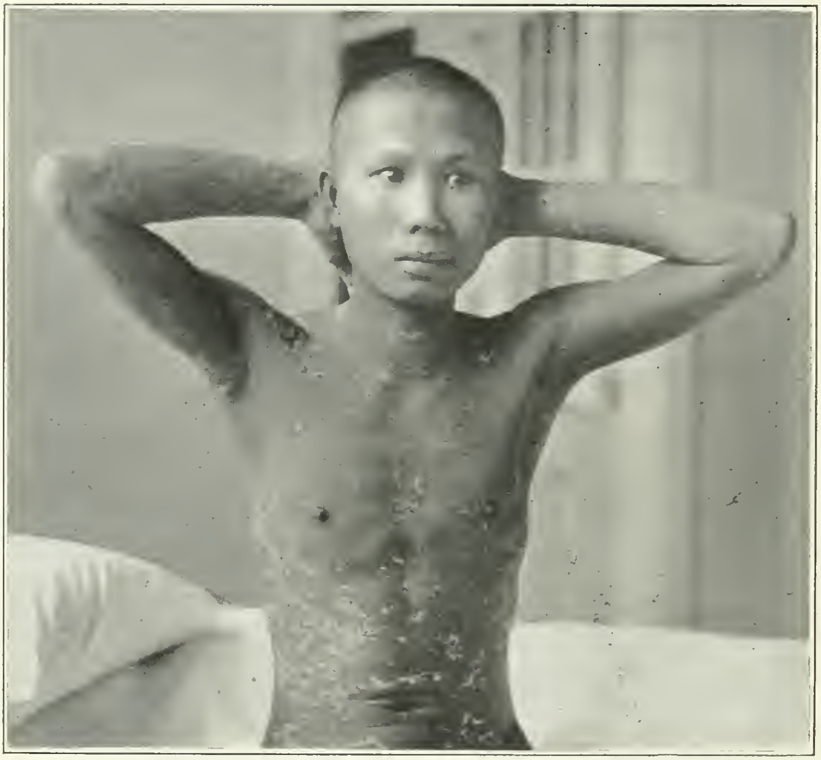


Fig. 3.—Case 2.

daily. The moist scales were removed with olive oil three times or more often daily. Calamine and zinc lotion was freely applied following the oil application. If the itching was severe 2 per cent each of phenol and menthol were added to the calamine lotion. The severest case was given a daily tub bath on account of the large amount of pus under the skin.

REPORT OF CASES

The first two cases were received on the division during the time that F. T. Lau, Lieut. M. C., U. S. N. R. F. was in charge.

Case 1.—F. M. J., seaman, 23 years. Admitted March 22, 1918. Patient gave history of initial lesion two months before admission. No other signs of lues except scar on penis, general adeopathy and 4 plus blood test. He was given 4 doses of salvarsan 0.4 gram each dose. Two days after the last administration his skin became hyperemic; in three days more he began with the typical desquamation and peeling. Sent to duty June 20, 1918. Wassermann Negative.

Case 2.—G. H. K., Y-2c., 25 years. Admitted January 4, 1919. Patient says that at hospital overseas following the appearance of an initial lesion and a rash he received 8 doses of salvarsan at four day intervals. On admission patient had severe scaling and crusting of the entire body. Given the treatment described above and sent to duty March 27, 1919, with a negative Wassermann.

Case 3.—H. L. A., Private. 28 years. Admitted November 3, 1920. Patient denied knowledge of initial lesion. Wassermann was found to be 4 plus in routine blood test. No other signs of lues except general adenopathy. Patient had had 4 doses of arsenobenzol before admission. Six days after he had had the last dose on the outside he was given 0.6 gram of arsphenamine and three days afterward developed dermatitis exfoliativa. (Fig. 1.) Sent to duty March 27, 1920, with negative Wassermann.

Case 4.—I. R. D., Matt-3-c., 22 years. Admitted December 26, 1920. Patient was admitted to the sick list for gonococcus infection of the urethra. Routine Wassermanns were found to be persistently 2 plus. He had no other signs of lues except general adenopathy. The case was probably one of congenital lues.

After the third weekly administration of arsphenamine 0.6 gram patient started with the typical redness of the neck and upper chest and complained of a sore throat. He had a temperature of 101 with corresponding elevation of pulse rate. The case resembled scarlet fever very much. He did not vomit. In three days the branniness appeared over the entire body. Desquamation followed rapidly, large wet areas of the skin over the lower chest and abdomen peeling off and leaving raw surfaces. Fig. 2 shows the patient at the height of the disease.

During this stage there were large accumulations of pus under the parts of the skin that had not broken down. Although tub baths were first questioned as a means of treatment due to the dangers of further maceration they were tried with great success. For two or three days the patient was delirious at times although the urine only once showed a trace of albumen. It did show small amounts of arsenic. Fig. 3 shows the scarred skin resulting from the vast exfoliative process. Patient sent to duty May 18, 1920, with negative Wassermann.

YAWS; WITH REPORT OF A CASE WHICH DEVELOPED IN A TEMPERATE CLIMATE

By Lieutenant Commander C. S. STEPHENSON
Medical Corps, United States Navy

(With two illustrations)

THE FOLLOWING case is reported on account of the rarity of the disease in the United States, the fact that it was sent in under an erroneous diagnosis and the possibility of spreading the disease in an unrecognized case.

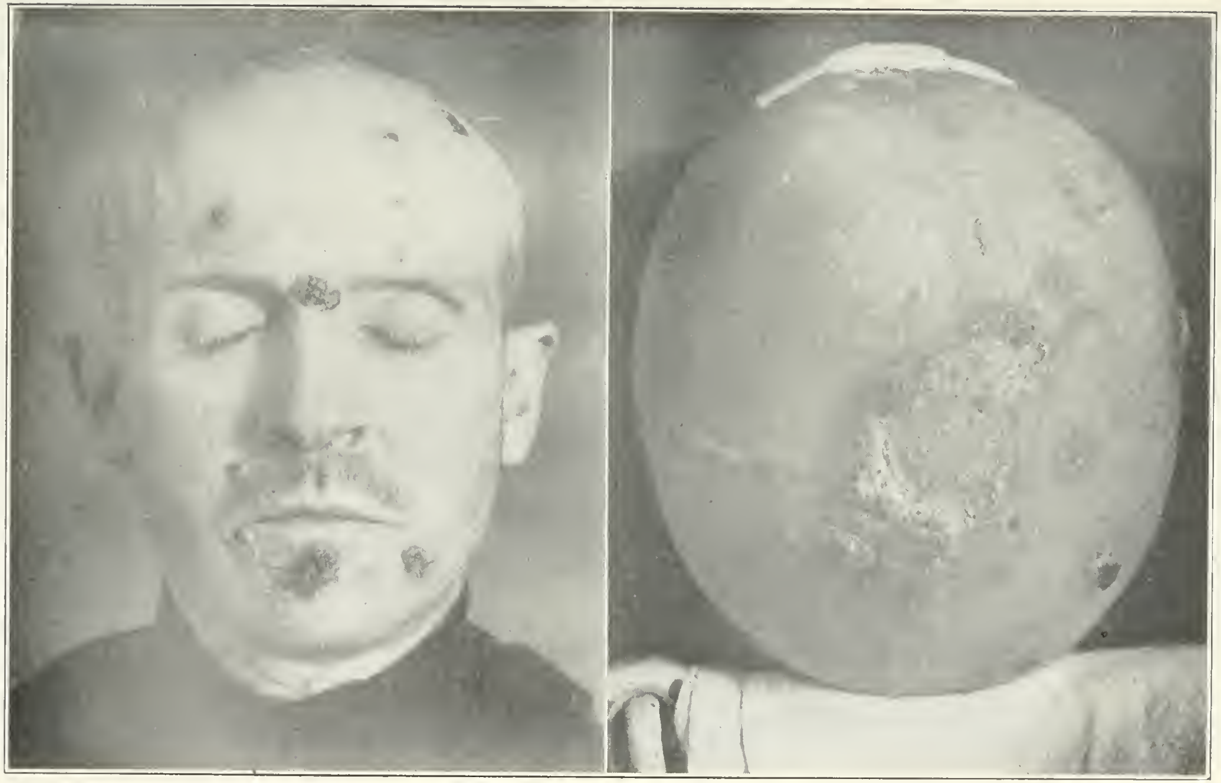
G. M., Elect. 1c, U. S. N., white, male, aged 26, married. Family history negative. Past history: diseases of childhood, chancroid five years ago, nothing else of interest, except that he was in Haiti, Santo Domingo and the Central American States in January, 1917.

Was admitted to the sick list December 15, 1919, in Brest, France, complaining of a headache and fever of 101° F. At this time he had a sore on the chin, another on the body near the left nipple, one at the nasofrontal junction and three or four on the scalp. He says that he ran a daily fever for about a week and always had some headache and bone pains. He got better except the sores, and on January 4, 1920, was transferred to the United States with the diagnosis of ampetigo contagiosa.

On admission, January 14, 1920, he presented the following crusted, circumscribed and pustular, foul-smelling lesions: one on the forehead, one on top of the head, of one month's duration, two that looked very much like ringworm of the scalp located on the occiput. These he had had for about three weeks. One at the peno-scrotal junction of about two weeks duration. The most interesting were those at the frontonasal junction and one on the chin. They were both granulomatous and not unlike a fig, both for color and consistency. The one on the forehead was about the size of a small strawberry and bled easily when examined.

The lesions of the head were ulcerative and distinctly ring-shaped, with raised borders and had a tendency to bleed when touched. All the lesions of the scalp exuded a yellowish foul-smelling discharge which had a marked tendency to crusting.

At the time of admission the accuracy of the diagnosis was doubted as it was believed to be a case of syphilis—the lesions frambesiaform syphilides, excepting the two on the occiput which were believed to be ringworm. Scrapings were made from these and found negative for mycelial threads. Two days later the Wassermann report came back 4



Yaws; with report of a case which developed in a temperate climate.

(To face page 344.)

plus in all antigens, but doubt arose over the character of the lesions and the patient was taken to Vanderbilt Clinic for consultation. Various diagnoses were made by the attendants with the majority voting for syphilis. A Brazilian dermatologist was visiting that day and gave the unhesitating diagnosis of yaws. Immediately serum from the lesions was examined and treponema demonstrated. Sections were taken for biopsy, reports of which follow: Intravenous administration of arsephenamine 6 gram and salicylate of mercury intramuscularly .065 gram once a week. The improvement was little short of marvelous after the first dose of arsephenamine and after the third practically all the crusts had fallen off. It is interesting to note that he had a chill on the day following the third dose of arsephenamine. His blood was examined and many parasites of benign tertian malaria were found. The arsenic was discontinued and intravenous quinine substituted for malaria. He had one moderately severe reaction following the quinine and made an uneventful recovery. One month after admission the Wassermann was still 4 plus in all antigens. No open lesions. He was given 30 days leave and on his return to the hospital his blood was still 4 plus. Another dose of arsephenamine was given and the blood was found to be 3 plus. Two more doses were given and he was sent to duty after 90 days well. Wassermann negative—all antigens.

PATHOLOGICAL REPORTS

1. Sections stained with hemotoxylin and eosin show tissue to be composed largely of irregularly hypertrophied epithelial tissue with a relatively small amount of corium, the surface being covered with exfoliated epithelial cells, hemorrhage and debris. Through the tissue proper there is marked infiltration by polymorphonuclear leucocytes with here and there small abscess-formation undoubtedly secondary infection.

2. Sections stained by Levaditi method of staining show treponema fairly numerous in the epidermis and not in the corium. It was unfortunate that tissue received did not include a larger section of corium on account of the fact that an important point of differentiation between the pathological picture of a skin lesion due to yaws, and a skin lesion due to syphilis is the finding of the treponema partenue in the epidermis in yaws and the treponema pallida in the corium in syphilis.

3. Diagnosis, yaws (1).

Low Power.—The slide can be divided into two areas, one of which is deeply infiltrated, the other slightly so. Over the first area there is a fairly marked acanthosis with enormous thickening of the granular layer. These features are lacking in the second area.

The infiltration in the main involved area extends from just below the epidermis down for three-fifths of the section. In the second area it is disseminated and lies about the vessels and skin adenexia in numerous foci in the upper three-fifths of the section.

High Power.—In both areas the infiltration consists almost entirely of large succulent polyhedral plasma cells. The vessels are slightly increased in number and somewhat dilated, but there is no inflammatory change in the walls such as found in syphilis. Neither is there any change in the connective tissue such as might be indicative of syphilis.

Summary.—Acanthosis plasmoma speaks either for yaws or syphilis. Probably the former because of the epidermal changes and the absence of vascular disturbance (2).

Diagnosis.—From bromide eruption which it may resemble. The history of taking bromides and eliminating the drug will clear this point.

Syphilis	*Yaws*
Primary lesions differ from secondary ones.	Primary and secondary lesions identical.
Pleomorphism of lesion.	No variations of lesions.
Affects mucous membranes.	Only affects the skin or region at junction of skin and mucous membrane.
Visceral involvement.	Viscera spared.
Central nervous system involvement.	Absence of brain and cord involvement.
Primary sore usually genital.	Primary sore almost always extra-genital.

Macleod[1] gives the following summary of the histologic points which differentiate it from the other infective granulomata: It is distinguished from (1) Actinomycosis and rhinoscleroma by the absence of their specific organisms. (2) From the lepromata by the absence of Hansen's bacillus. (3) From mycosis fungoides by the absence of "fragmentation" of the infiltrating cells, and of degenerative changes with the formation of products of degeneration in the collagen and elastin; by the presence of the epidermal changes peculiar to yaws. (4) From tuberculosis, apart from the tubercle bacillus, by the absence of the characteristic architecture with its giant cells, daughter plasma cells, more marked disintegration of the fibrous stroma, and complete disappearance of blood cells.

From syphilis by the following details, which, considered collectively, strongly suggest that yaws and syphilis are different histologic entities: (*a*) Cellular infiltration: plasma cells not so definitely arranged in rows or clustered around the blood vessels as in syphilis; no large multinuclear cells (chlorioplaques), or true giant cells, or intracellular hyaline degeneration noted in yaws; (*b*) fibrous stroma: rarification of collagen more marked than in syphilis, but no organization or celloid degeneration found, such as occurs in syphilitic gunmata; (*c*) blood vessels: no distinct proliferative changes in the vessel walls or endothelium, as frequently occur in syphilis; (*d*) epidermis: marked proliferation and down growth of the epithelium, with great thickening of the horny layer [illegible] to hyperkeratosis or parakeratosis) are characteristic of yaws, while they are unusual in syphilis (4).

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[1] *British Med. Jour.*, 1901, September 21, and Practical Handbook of the Pathology of the Skin, p. 200.

COMMENT

It is interesting to note that almost two years had elapsed since the patient had been in a country known to have endemic yaws, and the disease developed in the winter when the possibility of fly contamination was exceedingly small. He had not been away from Brest, France, for more than nine months.

The most likely source of infection was from a barber shop where he had been shaved regularly. This place was patronized by French colonial troops recently returned from Africa, and it is believed that this is where he became infected. Another probability is from an Algerian trooper who helped him make repairs on telephone lines, but he did not notice anything wrong with this soldier. The first thing he noticed was the sore on his chin, but he does not recall being nicked by a razor. It is probable that this is where the infection gained entrance and that it was the "mother" yaw. The lesions on the occiput so closely resembled ringworm of the scalp that almost every one seeing them made that diagnosis.

The malarial feature is rather surprising in that it developed in the wintertime without the patient's ever having had malaria before and almost two years after his tropical duty and after the administration of three 0.6 gram doses of arsephenamine.

The improvement of the skin condition after the first dose of arsephenamine was little short of marvelous. The lesions began to dry, many of the scabs dropped off, and by the end of the week the discharge had almost lost its odor and by the middle of the following week had entirely ceased.

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2. Pathological report from Vanderbilt Clinic, G. M. McKee.
3. Stitt: "Diagnostics and Treatment of Tropical Disease," p. 297.
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5. Photograph by Geo. M. McKee.

EDITORIAL

COMMISSIONED SERVICE IN THE NAVY AS A VOCATION FOR THE MEDICAL MAN

It has always been a matter of difficulty to secure for the medical departments of the Army and Navy an adequate number of men of the desirable type and possessing the general scholarship and professional attainments making for the highest success in these branches of government service, but today we are confronted by such a serious shortage of medical personnel that it behooves every member of the Medical Corps of the Army and Navy to give the question serious consideration, with a view to determining how the situation may be remedied. It is to the interests of the service at large and to his own interests that every individual officer do what he can to recruit large numbers of men for the corps, not by specious arguments, but by a frank presentation of all the features, both good and bad, leaving the decision to the candidate's best judgment, based on his tastes, his temperament and his views of life.

The great fundamental objection to the career of a naval medical officer is the recurrent necessity for going to sea for periods of two to three years during the greater part of his service until he has reached 45 or 50 years of age. This feature of naval service cannot be eliminated nor modified. In the case of married officers it entails separation from the family, and the wife and mother living ashore must bear many burdens which the wives of men in other walks of life usually share with the husbands or do not have to endure at all. The only reply to this objection is that the periodic cruises are not an unmixed evil. The essential and very venerable institutions of marriage and the family are not without their elements of weakness and are constantly assailed, both from within and without, by conditions growing out of the frailties and imperfections of human nature. However, in the great majority of cases navy marriages and navy families are happy ones and it has been suggested, not without a show of reason, that one element in the successful navigation of the sea of matrimony in these cases is due to the absence of that unbroken monotony which menaces the contentment of so many households ashore. Be this as it may, the trial of frequent separations is undoubtedly offset in a measure by the enjoyable novelty of varied experiences, travel and change which the wife and children enjoy, as well as the husband and father in uniform. Many a navy wife has had pleasure and profit from a visit to China, Japan, the Philippines, our island stations in Hawaii, Porto Rico, Haiti, Santo Domingo, the Virgin Islands, Samoa and Guam, and to Europe which she might never have enjoyed as a civilian's wife. While there is hardship in having, when ashore, to shift one's household goods from east to west coast or from New Hampshire to Louisiana or Florida, there are incidental compensations. (The hardship is not a financial one now that government provision is made for transfer of effects and there is reimbursement for the travel expenses of one's family.)

In every other respect the naval service may be recommended and it offers a career in which the talented, ambitious and well-qualified medical man may find full scope for his abilities. A careful retrospect of the history of the naval medical corps must infallibly convince the unprejudiced that, however unsatisfactory this or that detail may be for the moment, there has been continuous, progressive improvement in all the circumstances of the naval surgeon's life—rank, pay, promotion and general standing; that the character of his professional work and his opportunities for study and improvement have constantly broadened in scope and variety. Our material equipment in the medical departments of ships, at naval stations and in our hospitals ashore and afloat, has always been the equal or superior of that of other navies and has been steadily enlarged and elaborated from year to year. Changes for the better have been slow in some directions and rapid in others, but there has always been development in the Medical Department of the Navy. This incontrovertible fact is the most powerful argument that can be advanced to those who are considering the selection of a life work, more particularly, perhaps, to those who relish constructive work; to those who incline to the scientific side of medicine; to those who appreciate the tendencies of modern medicine and the increasing importance of its sanitary, preventive, industrial and social aspects; to those who wish to enjoy a broad horizon and aspire to develop into broadminded citizens of the world. It is of course true that there have been times, even extending over a considerable period, when conditions were not wholly satisfactory, but a sufficiently wide survey of the general features of service life demonstrates that its general trend is upward and onward. The medical officer who is temporarily discouraged and disposed to take a gloomy view of the future should ask himself if he is not better off than those who preceded him and the answer, if candid and honest, must convince him that the service has not been stationary.

For the moment, under the abnormal conditions that inevitably followed the convulsions, the catastrophe of war, the recruiting of medical officers has become one of exaggerated difficulty for a number of reasons. One is that the field of remunerative labor for the beginner in medicine has been in some respects very considerably enlarged in civil life. Except when family connections or personal relations afford special and unusual opportunities for coming to the front, the young physician usually begins his labors in those strata of society recognized as the most readily accessible to the newcomer in any given section. Recent economic conditions have resulted in a partial redistribution of wealth. Today the young graduate may settle in a small city or town and charge and collect fees such as were unthought of five years ago. Thousands and thousands of people throughout our country today are living in a degree of comfort and affluence formerly unattainable. The sick in this class of society are not compelled to attend free dispensaries and hospital clinics, but can and do have their private physician in attendance and summon him for minor ailments that would have been endured untreated in former days. This means that the young man having energy and medical capacity may quickly establish a remunerative practice in the small city, town or rural section far more easily than used to be the case, and hence the government services no longer attract those who are under the necessity of attaining financial competency from the earliest possible moment after graduation.

On the other hand, the successful establishment of a medical practice in a large center is increasingly difficult, because here there is more "team work," specialists are numerous, and the entrée to high-grade practice depends on connections with hospitals and clinics, where positions are assigned only to men of experience and recognized standing. In the medical centers of importance the profession is characterized by schools of practice and by distinct coteries, and men in one field refer patients whose needs spread beyond it to their colleagues, friends and associates. This makes it increasingly hard for the young and untried physician to gain a foothold, and the difficulty is perhaps proportionate to the ultimate rewards he aspired to. This feature of medical practice is lost sight of by those who, having enjoyed unusual opportunities to qualify, feel justified in seeking a field of work giving promise of more conspicuous ultimate return, but it is important to have it presented to them.

For the recent graduate who therefore must choose between quick returns in a limited field and a long and trying wait for recognition in more attractive surroundings it may still be wise to consider the claims of government service. Of course, if wealth is his main objective, the man debating about where to settle and what line of work to pursue need waste no time in thinking of the Army or Navy. There are, however, many medical men to whom a modest competency is sufficient enticement if they can earn it in congenial surroundings for interesting work. Added to the pleasure of travel and the interest attaching to a wide knowledge of the world and mankind is the spice of adventure. To this class of young physicians the naval service presents its claim with confidence, able to assure them immediately a dignified and respectable position, free from undue anxiety about the future and abounding in opportunities for the exercise of their talents in association with their equals in education and social standing. It offers also a guaranty of sufficient leisure and the necessary facilities for study along many collateral lines, as well as for travel and diversion. To the man confronted with the prospect of years of slavery as a general practitioner, toiling early and late at the beck and call of any and everybody, unable to enjoy an occasional vacation, tied hand and foot to an office, the victim of those whims and vagaries of patients whereby a man's whole career may be wrecked far more readily than it can be made, the service furnishes an agreeable alternative deserving of the most careful consideration. While it may be true that the government service harbors here and there a lazy and not too competent servant, I can assure you that I know of no field of work in which genuine and striking merit is more quickly recognized and given more unreserved praise than in the medical corps of the Army and Navy. These services are free from the curse of professional jealousy and they demand so many different forms of endeavor and present such a variety of opportunities that there is room for every type of talent to reach its greatest possible expansion.

To officers in the Reserve and to those holding temporary commissions in the medical corps we offer a cordial invitation to throw in their lot with us of the regular service. They have seen the worst and also the best sides of our life. They have endured the privations, discomforts and hardships incident to war service, but at the same time have had an opportunity to gauge the spirit and temper of the men of all grades and all branches of the naval establishment among whom they would be thrown. Some have felt that they were not temperamentally adapted to the life of the Navy, and that it would be unendurable except for a season at the call of their country's need. Others, and I believe a large number, have experienced in no small measure the subtle charm of the life and have refrained from embracing it only because of uncertainty as to the prospects it afforded to persons situated as they were; because of the difficulty of forecasting just what status they would have and how far that status would enable them to discharge obligations already contracted to those dependent upon them. It has been impossible to give these officers definite information in advance of definite legislative enactments settling the matter of eligibility depending on age, and the rank and pay to which they would be entitled on enrolling in the permanent forces. The long delay in announcing a program has been deeply regretted, but this unfortunate situation was beyond the control of any one individual. We are now able to submit at last a clear statement of the conditions attending permanent enrollment in the Naval Medical Corps as set forth in the following official circular of information.

NAVY DEPARTMENT, BUREAU OF NAVIGATION.
WASHINGTON, D. C., *July* 26, 1920.

INFORMATION FOR TEMPORARY MEDICAL AND DENTAL OFFICERS OF THE NAVY AND FORMEDICAL AND DENTAL OFFICERS OF THE NAVAL RESERVE FORCE WHO ARE ELIGIBLE FOR TRANSFER TO AND APPOINTMENT IN THE MEDICAL CORPS OF THE U. S. NAVY.

The Naval Appropriation Act of June 4, 1920, contains certain personnel provisions whereby officers holding temporary commissioned and warrant ranks in the Navy and members of the Naval Reserve Force of commissioned and warrant ranks are made eligible for transfer to and appointment in the permanent grades or ranks of the Navy for which they may be found qualified, not above that held by them on the date of transfer, and also not higher than the rank of lieutenant.

The following extracts from this act cover the status of eligibility of all temporary medical and dental officers in the Navy, and all medical and dental officers of the Naval Reserve Force:

"That officers holding temporary commissioned and warrant ranks in the Navy and members of the Naval Reserve Force of commissioned and warrant ranks shall be eligible for transfer to an appointment in the permanent grades or ranks in the Navy for which they may be found qualified not above that held by them on the date of transfer, but not to exceed a total of 1,200 commissioned officers in the line, of which number 500 may be appointed from class five, Naval Reserve Flying Corps, with proportionate number in all staff corps as now authorized by law, except that the Medical, Dental and Supply Corps shall be entitled to such additional numbers as are necessary to make up the full quota of officers in those corps, as now authorized by law.

"That, in addition to the number of transfers and appointments hereinbefore allowed, commissioned warrant officers of more than fifteen years' service since date of warrant or date of first appointment, as paymaster's clerk, pharmacist or mate, who have creditably served in the war with the German Government in temporary commissioned ranks or grades in the regular Navy, shall be appointed to a permanent rank or grade for which they may be qualified as established and shown by their records of service during their term of service not above the temporary rank or grade held by them at the time of transfer: *Provided*, That officers so transferred to the line of the Navy shall take rank therein in accordance with their precedence while holding temporary rank: *Provided further*, That all officers so transferred in accordance with sections 3 and 4 of this act to the Staff Corps of the Navy shall take precedence with each other and with other officers in the Navy in such order as may be recommended by a Board of Naval Officers and approved by the Secretary of the Navy: *Provided further*, That no transfers or appointments made in accordance with sections 3 and 4 of this act shall be to a higher grade or rank than lieutenant in the Navy: *And further provided*, That officers appointed to the permanent Navy in accordance with the foregoing sections who now hold permanent warrant or permanent commissioned warrant rank in the United States Navy shall, if they thereafter fail professionally on examination for promotion, revert to such permanent warrant or permanent commissioned warrant status.

"That officers appointed under any of the foregoing provisions shall be not more than 35 years of age when so appointed to the line of the Navy, Construction Corps or Supply Corps, and not more than 43 years of age when so appointed to the Corps of Chaplains, or to the Medical, Dental or Civil Engineering Corps: *Provided*, That said age limits shall be increased in the case of officers who have rendered prior service as paymaster's clerks or as mates, or as warrant or commissioned officers in the naval service to the extent of all prior naval service: *Provided further*, That officers originally appointed to the Dental Corps above the said age limits shall be eligible for appointment and promotion under this act irrespective of age."

Procedure of Transfer

Those eligible candidates who desire to avail themselves of the opportunity afforded by these provisions will at once communicate with the President of the Board of Medical Examiners and Naval Examining Board nearest their home, if on the inactive list, requesting that a date be set for the individual's appearance before the boards. Examining boards will be convened at the following named stations: Naval Hospital, Portsmouth, N. H.; Naval Hospital, Newport, R. I.; Naval Hospital, Boston, Mass.; Naval Hospital, New York, N. Y.; Naval Hospital, League Island, Pa.; Naval Hospital, Norfolk, Va.; Naval Hospital, Charleston, S. C.; Naval Hospital, Pensacola, Fla.; Naval Hospital, Key West, Fla.; Naval Hospital, New Orleans, La.; Naval Hospital, Great Lakes, Ill.; Naval Hospital, Fort Lyon, Colo.; Naval Hospital, Puget Sound, Wash.; Naval Hospital, Mare Island, Calif.; Naval Hospital San Diego, Calif.; Naval Medical School, Washington, D.C.

When the candidate reports for examination he will present the enclosed form of application, made out in all details. His application will in itself constitute his authority to appear for examination.

The Navy Department does not issue orders authorizing travel or expenses incident to the appearance of candidates who are on the inactive list before examining boards.

All eligible candidates who have had a minimum of one year's consecutive active service will, if they so elect, fill out the form requesting that their professional qualifications be adjudged by their service records. Eligible candidates who have not had a minimum of consecutive service for a period of one year will be examined by the local naval examining board upon the subjects of general medicine, general surgery, hygiene and sanitation, in the case of medical officers. Dental officers will be examined in dental materia medica and therapeutics, anatomy, oral surgery, and dental bacteriology and pathology. If eligible for the rank of lieutenant in either the Medical or Dental Corps, *Naval Regulations* and the *Manual for the Medical Department* will also be included in the subjects.

In the event a candidate requests examination based upon his record, the Board of Medical Examiners will, upon completion of their examination, forward their report, together with the candidate's application attached thereto, direct to the Bureau of Medicine and Surgery. Upon receipt of such a report, if the candidate is found physically qualified, the proceedings of the Board of Medical Examiners, together with his complete service record, will be laid before the special Naval Examining Board convened for the purpose of making report and recommendation based upon the professional qualifications previously demonstrated by the candidate's record. In the event the candidate has been found physically disqualified, the proceedings will be discontinued, and the candidate considered to be disqualified for transfer.

When the candidate is to be examined by the local naval examining board this examination will be conducted immediately after the physical examination. In the event the candidate is found physically disqualified, and the Board of Medical Examiners recommends a waiver, he may proceed with the professional examination, if he so desires. He should, however, understand that final action, in the event that he successfully passes the professional examination, depends upon the action of the Navy Department in considering the suitability of granting a waiver in his particular case.

The naval examining boards must specifically state whether or not the candidate is found qualified for the rank for which he is eligible, and if not qualified for that rank, must specifically state that he is qualified for the lower rank, or for none, as the case may be.

All candidates who are found qualified will be immediately commissioned in the rank for which they are found qualified, but the question of their precedence in relation to medical officers of the same rank and to all other officers of the Navy will be determined by a board of naval officers convened for that purpose, upon approval of the Secretary of the Navy, in accordance with the act of June 4, 1920.

In the case of officers on active duty application will be made direct to the Bureau of Medicine and Surgery, instead of to the Naval Examining Board, when the necessary authority will be issued by the Navy Department to the officer concerned to appear for examination.

Important.—It is directed that all eligible officers of the Medical and Dental Corps inform the Bureau of Medicine and Surgery *without delay* of their intentions in relation to transferring to the regular service.

There are 570 vacancies in the Medical Corps and 75 vacancies in the Dental Corps which will be filled as rapidly as candidates apply and are found qualified.

THOS. WASHINGTON,
Rear Admiral, U. S. Navy, Chief of Bureau.

APPLICATION FOR TRANSFER UNDER ACT OF JUNE 4. 1920
TO THE DENTAL CORPS, U. S. NAVY.

....
....
..................1920.

From: ....M. C.[1] Class...... U. S. N. R. F.
U. S. N. (T).

To: President, Board of Medical Examiners and Naval Examining Board,

....

(Bureau of Medicine and Surgery in case of officers on active duty)

Subject: Application for examination to determine my qualifications for appointment in the Medical Corps, U. S. Navy.

Reference: (*a*) Naval Appropriation Act of June 4, 1920.

1. I hereby make application to present myself for examination for appointment as a ....in the Medical Corps of the United States Navy.

2. I was born at ...., and was .... years of age on the .... day of .... 19 ; and am a citizen of the United States, residing in ...., County of .... in the State of ...., and graduated from .... Medical School in ....

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[1] Applicants for the dental corps should substitute "dental" for "medical" on this form.

3. My eligibility is established by the fact that on 19
I was enrolled as a .... in the Medical Corps of the Naval
Reserve Force, and was first assigned to active duty at ....
on .... 19 . I served continuously on active duty until ......
.... 19 , when I (was released from active duty)
(resigned my temporary appointment, and reënrolled in
U. S. N. R. F., on .... 19), and am within the age limit of 43
years $\left\{\begin{matrix}\text{with}\\ \text{without}\end{matrix}\right\}$.........years .... months active commissioned or warrant
service deducted.

4. If this application is approved I have to request that my examination to establish my mental, moral and professional qualifications be based upon—

(a) My record.
(b) Actual examination in the subjects set forth in circular letter of July 26, 1920, with a review of my record to establish my moral qualifications.

NOTE.—Strike out the language which does not apply. All candidates who have less than one year's continuous active service in commissioned or warrant rank are required to qualify by actual examination.

W. C. BRAISTED,
Surgeon General, U. S. Navy.

ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, July 14, 1920, the following names were proposed and elected to membership in the Association:

Medical Corps, U. S. Army

Colonel

John Oliver McReynolds

Lieutenant Colonels

James Gordon Cumming
William Alexander Fisher, Jr.
Garnett Nelson
William W. Williams

Majors

Charles K. Berle
Horatio N. Boshell
Burgh S. Burnet
Christian Henry Dewey
C. M. Dollman
Edwin L. Draper
George M. Edwards
Frank D. Francis
Harold G. Herrick
John M. Hewitt
Charles A. Lusk
T. E. Oertel
Harry R. Oliver
James Emory Phillips
Edward John Scannell
Norman McL. Scott
John W. Sherwood
James M. Stoddard

Captains

Karl Murdock Bowman
John Carling
George Bruce Crist
Joseph Raymond Criswell
Harry Willard Fleck
Arthur R. Gaines
Howard B. Garner
John Albert Green
Gilbert L. Gosslee
John Samuel Hickman
Cecil James Johnston
Stanley Morton King
Burlin George McKillip
Robert Benjamin Morris
James Joseph O'Keefe
William R. Strange
George Clarke Sullivan
James Allen Trowbridge
Francis Allen Wells
Benjamin Franklin White, Jr.
Willard J. White

First Lieutenants

Harry J. Anderson
Samuel G. Boyce
Lynn W. Elston
Guy F. Ewing
R. L. Fraser
Michael H. Gleason
Arthur L. Guerra
Rae E. Houke
Marvin Fisher Jones
Harvey Robinson Livesay

Medical Corps, U. S. Army

First Lieutenants

Rees Stephen Lloyd
Wallace P. Martin
Lee Roy MacBurney
James Bertrand McAvoy
Sheppard Remington
George W. Smail
Jacob John Spencer
Philip Richard Zinn

Medical Reserve Corps, U. S. A.

Lieutenant Colonels

Richard Bew
Alfred J. Brown
James A. Harvey

Majors

Ralph Alexander Stewart
Alexander L. Anderson
Delano R. Aves
Thomas Callahan Davison
Gerald A. Ezekiel
Ralph S. Hedges
Clarence W. Lincoln
James T. Madden
Thomas Albert Neal
Charles Houston Young

Captains

Ipolitas Benediktas Bronushas
James H. Caton
Sherwin A. Cootey
John Morse Griffin
Hernandez Grossman
Harmon Ellsworth Price
John E. Stansbury
Daniel Paul Wright

First Lieutenants

Thomas Floyd Leatherwood
Charles G. McGaffin
Lewis Dell Mills

Medical Corps, U. S. Navy

Lieutenant Commander

William Henry Connor

Lieutenants

James Richard Allison
Romeo Winton Auerbach
John Francis Cremens
Hubert W. Harris
Douglas C. McBride
James Floyd Terrell

Medical Corps, U. S. N. R. F.

Commander

Rea Smith

Lieutenants

Edward Frothingham
Archibald Campbell Maeleish
Wm. Gerry Morgan
Henry John Sangmeister
Willard Anthony Thompson

U. S. P. H. Service

Senior Surgeons

Alfred P. Chronquest
Horace M. Evans

Surgeon

Joseph Goldberger

P. A. Surgeons

James Franklin Douglas
Lawrence Kolb
Knox Emerson Miller
David J. Prather
William Clinton Sheehy
Raymond St. Clair

Assistant Surgeons

Harry Evans Trimble

Acting Asst. Surgeons

Samuel Orr Black
George William Edgerton
Alexander E. Fadil
Anna Dixon Peck

Major, M. C., Vermont N. G.

Ray Ernest Smith
Formerly M. C., U. S. A.
Dr. James Pennoyer Inslee

BOOK REVIEWS

THE CATARRHAL AND SUPPURATIVE DISEASES OF THE ACCESSORY SINUSES OF THE NOSE, by Ross Hall Skillern, M.D., Professor of Laryngology Medico-Chirurgical College, Post-Graduate School, University of Pennsylvania; Late Lieutenant-Colonel, M.C., U.S.A.; Fellow of American Laryngological Society; Fellow of the American College of Surgeons; Fellow of the American Laryngological, Rhinological and Otological Society; Fellow of the New York Academy of Medicine; etc., etc. 300 Illustrations. Third Edition, thoroughly revised and enlarged. Philadelphia: J. B. Lippincott Company, Washington Square. Price $6.50.

It is related that a great artist was once asked with what medium he mixed his colors and that he replied, "With brains, Sir, with brains." Unfortunately one can not always say so much with reference to the medical textbook. It is, therefore, all the more a pleasure when a book comes to hand in which the author has exhibited such rare good judgment as has Dr. Skillern. It is complete without being verbose direct in statement and consecutive. In the present edition there have been added some thirty half-tone illustrations and two colored plates. A few of the illustrations have been reduced in size but this does not detract from their value. The text has been considerably amplified and brought up to date and a chapter on Pan-sinusitis has been added.

No one interested in the subject with which it deals can afford to be without this valuable addition to his library.

The book-maker is also to be congratulated upon the excellence of print and illustration of the volume.

T. E. OERTEL.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

THE PATHOLOGY OF INFLUENZA, by M. C. Winternitz, Isabel M. Wason and Frank P. McNamara. New Haven, Conn.: Yale University Press.

A GENERAL INTRODUCTION TO PSYCHOANALYSIS, by Prof. Sigmund Freud, L.L. D. New York: Boni and Liveright.

THE PRINCIPLES OF ANATOMY AS SEEN IN THE HAND, by Frederic Wood Jones, D.Sc., M.B., B.S. With two plates and 123 text figures. Philadelphia: P. Blakiston's Son & Co.

ACCESSORY SINUSES OF THE NOSE, by Ross Hall Skillern, M.D. Third edition, revised and enlarged. 300 illustrations. Philadelphia: J. B. Lippincott Company, Washington Square. Price $6.50.

THE DUODENAL TUBE AND ITS POSSIBILITIES, by Max Einhorn, M.D., Prof. of Medicine at the New York Post Graduate Medical School. Octabo of 122 pages with 51 illustrations. Philadelphia and London: W. B. Saunders Company. 1920. Cloth, $2.50 net.

DIAGNOSIS AND TREATMENT OF BRAIN INJURIES WITH AND WITHOUT A FRACTURE OF THE SKULL, by William Sharpe, M.D. 232 Illustrations. Philadelphia and London: J. B. Lippincott Company. Price $8.00.

PUBLIC HEALTH AND INSURANCE—American Addresses—by Sir Arthur Newsholme K.C.B., M.D., F.R.C.P. Baltimore, Md.: The Johns Hopkins Press. 1920 Price $2.50.

THE AMERICAN RED CROSS IN THE GREAT WAR, by Henry P. Davison, Chairman of the War Council of the American Red Cross. New York: The MacMillan Company. Price $2.00.

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THE
MILITARY SURGEON

VOL. XLVII OCTOBER, 1920 NUMBER 4

DIRECTIONS FOR MAKING TRIPLE TYPHOID VACCINE, WITH INTRODUCTION

BY COLONEL FREDERICK F. RUSSELL, M.C., U.S.A., MAJOR HENRY J. NICHOLS, M.C., U.S.A., and CAPTAIN CLARENCE O. STIMMEL, M.A.C., U.S.A.
Army Medical School, Washington, D. C.

(With twenty-three illustrations)

TABLE OF CONTENTS

INTRODUCTION

A. Historical note.
B. Addition of Bacillus paratyphosus A and paratyphosus B.
C. Standardization by nephelometer.
D. Correction of reaction.
E. Soluble fraction.

DIRECTIONS

1. Explanation and definitions.
2. Cultures and suspensions.
3. Culture media, glassware, etc.
4. Planting.
5. Washing and collecting.
6. Heating.
7. Standardization.
8. Diluting.
9. Testing.
10. Pooling and mixing.
11. Ampulling.
12. Re-testing.
13. Animal tests.
14. Retained samples.
15. Labeling.
16. Packing.
17. Records.
18. Yearly record showing loss from contamination.
19. Specifications for vaccine ampules.

INTRODUCTION

A. HISTORICAL NOTE

THE manufacture of typhoid vaccine was begun by Russell in 1908 at the Army Medical School. The technic was worked out on animals, chiefly rabbits, using the agglutinating titer of the serum as an index of immunity. The procedure decided on was a modification of the English broth vaccine and the German agar vaccine methods. The aim was to change the typhoid bacillus as little as possible by killing it at a minimum temperature, and to add for safety a disinfectant which would not lower the immunizing power of the vaccine.

Since 1909 typhoid vaccine has been made continuously at the Army

Medical School, and large quantities have been supplied to the Government Services. Enough vaccine has been made to vaccinate over 10,000,000 individuals. The product from the School became compulsory in the Army in 1911 and soon after in the National Guard and Navy. It is also used to a considerable extent in the Forestry Service, the Agriculture Department and the Public Health Service. The same technic and cultures have also been adopted by many State Board of Health Laboratories and commercial firms for the use of the general public. A description of the method used was published in 1914[1] and a modification of this method was adopted by the Hygienic Laboratory as a standard.[2] As several changes have been made, including the addition of Para A and B, quantity production, new methods of standardization and correction of reaction, it is considered desirable to record the present technic and to discuss the changes briefly. A record of the results of the use of the vaccine has been given elsewhere by Russell[3] and a discussion of the related subjects has also been given elsewhere by Nichols.[4]

Colonel Russell was at first assisted by Dr. John S. Neate at the Army Medical Museum, Washington, D. C. In 1910 the vaccine equipment was moved with the School to 721 Thirteenth Street, N. W. In 1915 the School and equipment was moved to its present location, 462 Louisiana Avenue. It is planned, when the School reaches its final home at the Walter Reed Hospital grounds, to have specially designed quarters for the Vaccine Department. The following officers and men have been in charge of the manufacture of typhoid vaccine after the method was established: 1911–1914, Major H. J. Nichols and Sergeant C. O. Stimmel; 1915–1916, Major M. A. Reasoner and Sergeant Stimmel; 1917, Major Corydon G. Snow and Sergeant Homer Paxton; 1918, Lieutenant Bolin and Sergeant Thomas Hill; 1919–1920, Captain C. O. Stimmel and Second Lieutenant Thomas Hill, S. C.

B. ADDITION OF BACILLUS PARATYPHOSUS A AND BACILLUS PARATYPHOSUS B

Until 1916 typhoid vaccine alone was made out of the single strain "Rawlings," of the English Army vaccine. A few cases of paratyphoid, chiefly Para A, occurred each year, and evidence accumulated to show that the typhoid vaccine did not cross protect against paratyphoid infections. The cases, however, seemed too few to justify the addition of the paratyphoid bacilli. During the mobilization on the Mexican border, in 1916, however, several small epidemics of Para A occurred from endemic sources among the Mexicans along the border. A Para A and B vaccine was made for local use, and after the declaration of war in 1917 a triple vaccine was made, following the experience and procedure of the Allies. Since the war the manufacture of triple vaccine has been continued as a measure of preparation for possible use in Mexico and for general protection of the Army in all parts of the world. Single strains of Para A and Para B were selected out of a number, using as standards for selection good agglutinogen content, good cross agglutination power with sera of typical strains, good suspending power, and moderate toxicity.

C. NEPHELOMETRIC METHOD OF STANDARDIZATION

The standardization of the vaccine has passed through several stages. At first the Wright method of counting bacilli by comparison with red blood cells was used. Then the direct method of counting in a Halber counting chamber was adopted. Recently estimation by means of a nephelometer has been used as described in the text and by Dunham.[5] This method has been tried for several months and has advantages over the previous methods.

D. THE REACTION OF VACCINES

With the introduction, in the hydrogen-ion system, of a simple and accurate method of determining the reaction of biological fluids, the investigation and control of the reaction of vaccines have become possible. Until recently little attention has been paid to this subject and it has apparently been assumed that vaccines are naturally neutral except for the possible absorption of alkali from containers made of soft glass. It has been found, however, that the reaction of typhoid vaccine may vary considerably and depends on two factors: (1) the amount of soluble alkali in the glass containers and (2) the amount of CO_2 absorbed from the air. In itself the typhoid bacillus does not change the ordinary reaction of (7.4 to 7.6) media in which there is no sugar which is fermented by the typhoid bacillus. As is well known, however, if the vaccine is put in soft glass containers, it becomes alkaline. This fact is illustrated in the following table:

	Present Reaction
1. Vaccine placed in soft glass ampuls in 1911	9.26
2. Vaccine placed in soft glass ampuls in 1911	9.70
3. Vaccine placed in hard glass ampuls in 1911	8.1
4. Vaccine placed in hard glass ampuls in 1919	7.4
5. Vaccine placed in hard glass ampuls in 1919	7.6

The variation of vaccines on the acid side is not so well recognized but is a definite factor due to the absorption of CO_2 from the excessive amount often present in the air of the preparation rooms. The reaction runs up as far as 6.4, but is usually 6.6 to 6.8. Vaccine saturated with CO_2 gives a reading (colorimetric) of 5.2, which holds at low temperature, but rises to 6. at room temperature.

The source of the CO_2 seems to be largely the gas flames used in the preparation rooms and in sealing, although the operators' lungs may contribute some CO_2 in a close room. The excessive amounts of CO_2 which may be present in the air are shown below. In sealing of ampules, CO_2 from the blast lamp may be blown into the ampule and materially change the reaction, as may be readily seen if phenol red is added to the vaccine before sealing. Ampules with large necks become acid rather than those with small necks. To avoid this "pouring in" of acid the ampules should be held at an acute angle to the base of the flame rather than at right or obtuse angles.

Analysis of Air of Rooms in which Vaccine is Made and Ampulled.
(Haldane's Method.)

Vaccine room:	CO_2	0	*N*
Control	0.035	20.815	79.15
No ventilation—			
Inoculation	2.07	18.01	79.92
Washing	1.59	18.52	79.89
Dilution	.86	19.1	79.94
With ventilation—			
Inoculation	1.17	20.27	79.613
Washing	.137	19.9	79.963
Dilution	.096	20.30	79.604
Ampulling room:			
Control	.035	20.815	79.15
No ventilation	.192	19.82	79.98
With ventilation	.088	20.29	79.622

Observations were made after about two hours of operation; number of operators 4 to 6.

These results show that the CO_2 under the best conditions is increased 3 to 30 times at certain stages. Under the old system of working, the CO_2 may be increased over 50 times. The old way of making vaccine was to use an hermetically sealed room in order to avoid contamination from dust. As a result, the air became heavily charged with CO_2 and was very hot and exhausting for the workers. Recently ventilation has been provided by an inlet for filtered air and an exhaust outlet. The temperature has also been somewhat reduced by refrigerating coils placed near the ceiling.

In order to make the vaccine of about the same reaction as the tissues, 7.2 to 7.4, and to protect it against variations in either direction, a buffer is added. A solution is prepared of 8.7 gms. $K\ H_2\ Po_4$ (6.4 per cent molar) and 165 gms. $K_2\ H\ Po_4$ gms. (93.6 molar) per one liter of distilled water. Two c.c. of this solution added to each liter of 0.85% NaCL solution used in making the vaccine has been found to hold the reaction at about 7.4. The reaction of the buffer solution is about 8, that of the buffered salt solution 7.4.

The possible effect of reaction on the immunizing power of a vaccine needs further investigation. As far as our work goes it appears that an alkaline vaccine is possibly superior to an acid vaccine or even a neutral vaccine. One of our recent results is as follows:

	1–1,280	2,560	5,000	10,000	20,000
Neutral vaccine, PH 7.4	....	+	+ +	....	......
Acid (saturated CO_2) PH 6	....	+	+	+	......
Alkaline, PH 8.5	....	......	+	+ +	......

Each + indicates highest agglutination dilution of one rabbit's serum for typhoid bacilli after the usual immunization.

E. THE SOLUBLE FRACTION

Typhoid vaccine was at one time considered simply as a suspension of typhoid bacilli in salt solution. In the preparation of the vaccine, however, especially during heating, a considerable amount of the typhoid bacillus goes into solution, so that a vaccine really consists of a soluble and an insoluble fraction. It has been known for a long time that agglutinogens are soluble and filterable and the filtrate of a vaccine has been found to contain practically as much agglutinogen as the bacilli themselves. A great many tests have been made on the subject and they all agree. The following is an average result:

	1–1,280	2,560	5,000	10,000	2,000
Original vaccine	....	......	......	+	+
Effluent (Sharples) centrifuge	....	+	......	+	+
Filtrate (Mandler) 8 lbs. pressure	+	......	+	+	......
Centrifugate (resuspended)	+	......	+	....	......

Each + stands for the result of agglutinations of one rabbit's serum. All animals were given 0.5 c.c. subcutaneously and the one c.c. intravenously twice at weekly intervals and were bled at end of ten days after last injection.

It is seen that the original vaccine and slightly turbid effluent were nearly equal in agglutinogens, while the clear filtrate was the same as the resuspended centrifugate. If the production of agglutinins is taken as an index of immunity, it is evident that the soluble part of the vaccine represented in the filtrate and in part in the effluent is not to be ignored.

This conclusion is one criticism of lipovaccine, which was used for a short time during the war. The effluent of a Sharples centrifuge was discarded and only the "skeletons" of the bacilli remained, embalmed in oil. As far as agglutinogens go, lipovaccines are practically inert and their protective value is problematical.

As has been said elsewhere,[4] one of the authors believes that the efficiency of the Army vaccine depends on its toxicity. The filtrate is toxic as well as agglutinin producing.[6] Hence, there is an additional reason for not discarding the soluble part of the vaccine. The production of agglutinins is a method of estimating immunity which has proved of practical value in many directions, but of course has its limitations. For example, our vaccine nine years old has almost as much agglutinogen as fresh vaccine, while it is not nearly as toxic and is not considered fit to use. The expiration date in the United States and of choice is four months, although six months is allowed in foreign countries on account of the delay in reaching distant and isolated stations.

DIRECTIONS.

1. EXPLANATIONS AND DEFINITIONS

Triple typhoid vaccine is made from a monovalent typhoid vaccine of a strength of 2,000 M bacilli per c.c., and from monovalent Para A and Para B vaccines, each of a strength of 3,000 M bacilli per c.c. These monovalent vaccines are mixed in a proportion of two parts of typhoid vaccine to one part of Para A and one part of Para B vaccines. Thus the final strength is 1,000 M typhoid bacilli and of 750 M each of Para A and Para B bacilli per c.c.

The main object in the most of the details of technic is to prevent contamination by spore bearing bacilli from the air, as this is the greatest cause of loss in manufacture. The tests are also mainly to detect such contamination. The inoculating and washing room is protected in every way possible from contamination of the air. The windows are sealed. Before each operating day the ceiling, walls, floor and fixtures are washed with 2 per cent compound cresol solution. The only entrance is through a vestibule and another room. The workers remove outer clothing at their lockers, put on bath robes, go to the vestibule where they put on sterile gowns and caps and then enter the inoculating room through the killing room. (Fig. I.)

Ventilation is provided by an exhaust fan, protected by a muslin filter, at the top of one window, and an intake, protected in the same way, at the bottom of another window. The temperature is kept down as far as possible by refrigerating coils. (Fig. IX.)

The ampuling room is sealed and ventilated in the same way as the inoculating room.

A lot is a unit for issue. Each lot is numbered serially. The last lot of date of June 24, 1920, is number 144.

A run is a working unit and results in a lot. A run made up of one section each of the three organisms would give about 8,000 c.c. of triple typhoid vaccine with a loss of some of Para A and Para B monovalent vaccines, as less of these vaccines are used and the growth is heavier. Sections are usually run, therefore, in proportion of typhoid, 8; Para A, 5; Para B, 4. Runs are not mixed.

A pooled vaccine is a mixed monovalent vaccine and is usually kept in 8-liter bottles.

A mixed vaccine is a mixture of the three monovalent vaccines, and is usually stored in 18-liter bottles.

A section is composed of 50 Kolle flasks. They are packed in a special galvanized iron rack. Galvanized iron crates, holding 52 flasks, are used for sterilization.

The mixers are brass cylinders containing 75 or 150 liters. They are hung on pivots for revolving and are filled from above and drained from below. They are sterilized in a large autoclave. (Figs. III and XVII.)

Positive air pressure for sealing ampules in a blast flame and negative air pressure for suction are provided by pumps and pipe lines.

2. CULTURES AND SUSPENSIONS

CULTURES

1. B. Typhosus: "Rawlings," isolated in 1903 from the spleen of a fatal case of typhoid fever in an English soldier during the Boer War. (From R. A. M. C. School, Netley, England.) *Jour. Hyg.*, 1905, V, 381.

2. B. Paratyphosus "A": "Kessel," obtained from the blood of a case of paratyphoid fever occurring in New York militia troops on the Mexican border in 1916. (From Department Laboratory, Southern Department, U. S. Army.)

3. B. Paratyphosus "B": "Rowland," from a case of paratyphoid fever in the English Army in France during the World War. (From the R. A. M. C., Netley, England.)

Several transfers of different dates are kept on sealed agar slants at room temperature in the dark in different places.

SUSPENSIONS. (Figs. V and VI.)

A. From single cell cultures of each of these strains make one set of three poured plates for each five sections. Incubate 48 hours at 37°

B. Examine colonies with microscope or hand lens and for each section ring one colony which has typical morphology and is large and well isolated. Ring two extra colonies of each culture for reserve.

C. From each colony make a transfer to two tubes, (1) stab and slant of double sugar agar, (2) a massive agar slant. Keep corresponding tubes together; incubate 24 hours at 37°.

D. Make Gram stain and microscopic agglutinations 1 to 1,000 of each double sugar tube of each typical set.

E. Select agar slants which correspond to double sugar tube growths giving positive agglutinations, add about 10 c.c. of broth to each slant; suspend growth and pour suspension into sterile test tubes for inoculation. Make pour plates with one loop from each tube; incubate 18 hours at 37° and examine for contamination. Keep tubes at room temperature overnight, and then make Gram stain of a heavy smear from each tube; discard any tube showing contamination by culture or smear. Contaminations are found in about 1 in 50 tubes.

3. CULTURE MEDIA, GLASSWARE, ETC. (FIGS. V–VI.)

A. For each section make about 2.5 liters of beef extract 3.5 per cent agar of a PH of 7.6. This amount allows 50 c.c. to each flask. Make baskets of agar slants and stabs, double sugar tubes and extract broth of same reaction. The agar and broth tubes should be about 20 mm. in diameter.

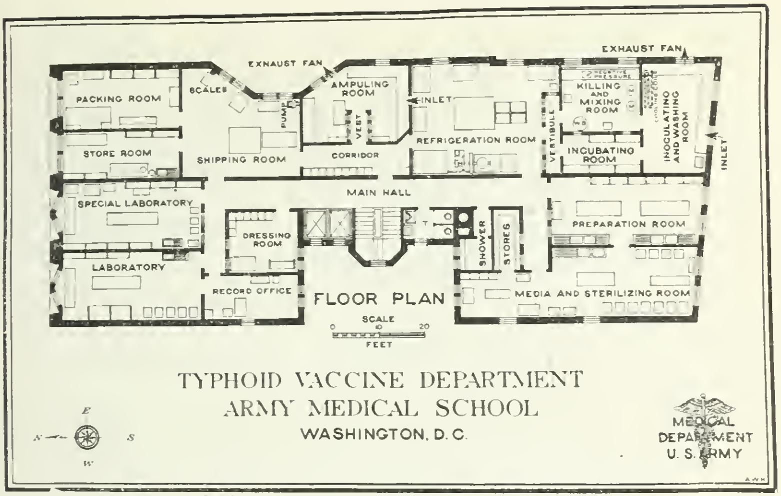
B. For each section plug 50 clean, clear, uncracked Kolle flasks with cotton. A few extra flasks should be prepared as reserve. Sterilize in hot air for one hour at 170°. Add agar from large burettes and sterilize in autoclave for one hour at 15 pounds pressure.

C. Lay flasks on flat surface at room temperature overnight to allow agar to harden. Invert and put in section racks at slight angle. Incubate 48 hours at 37°.

D. For each section make 6 liters 0.85% C. P. NaCL solution in distilled water with 2 c.c. of buffer solution for each liter. (Buffer solution PH 8.0, 8.7 grams monopotassium phosphate and 163.0 grams dipotassium phosphate per liter of distilled water.) Place this NaCL solution in one-liter flasks plugged with cotton and autoclave 2½ hours at 15 pounds pressure.

E. Make absorbent cotton swabs, two for each section, on wire rods; put in test tubes and sterilize in autoclave.

F. Prepare one collecting flask for each section and a few extra flasks for reserve. The collecting flask consists of a 2,000 c.c. flask graduated into 100 c.c. fitted with a two-holed rubber stopper. One hole carries a glass tube 3½ inches long, for attachment to a rubber



ADVANCE COPY MEDICAL AND SURGICAL HISTORY OF THE WORLD WAR

Fig. I.—Floor Plan.

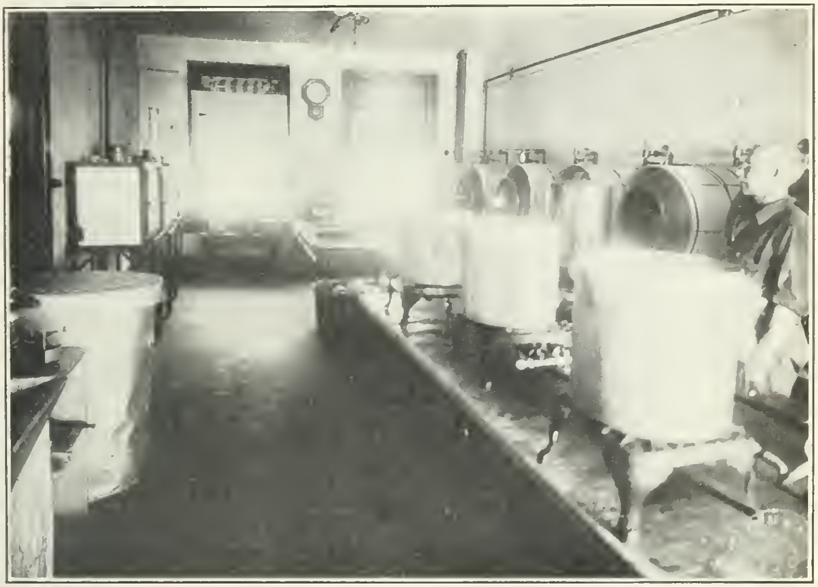


Fig. II.—Preparation Room; Hot Air Sterilizers, Autoclaves, Copper Kettles for Media.

(To face page 366)

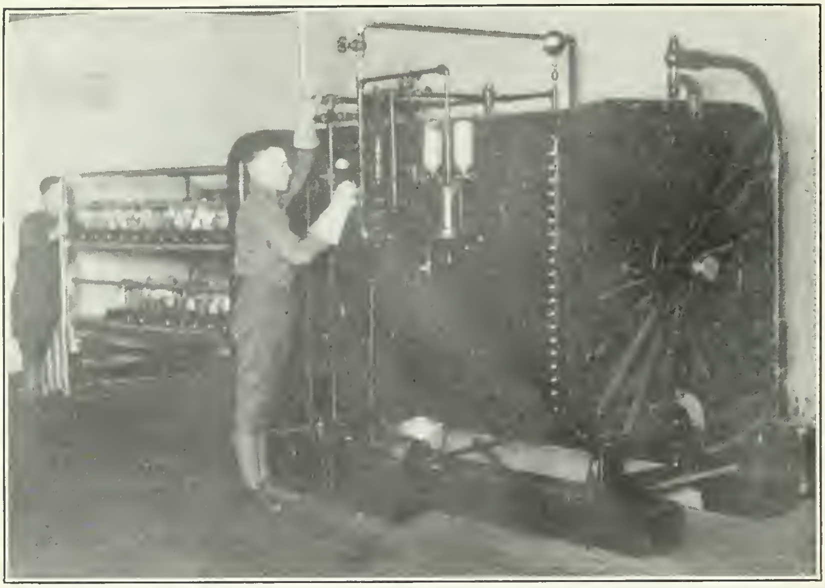


Fig. III.—Kinyoun Sterilizer Used for Autoclaving.

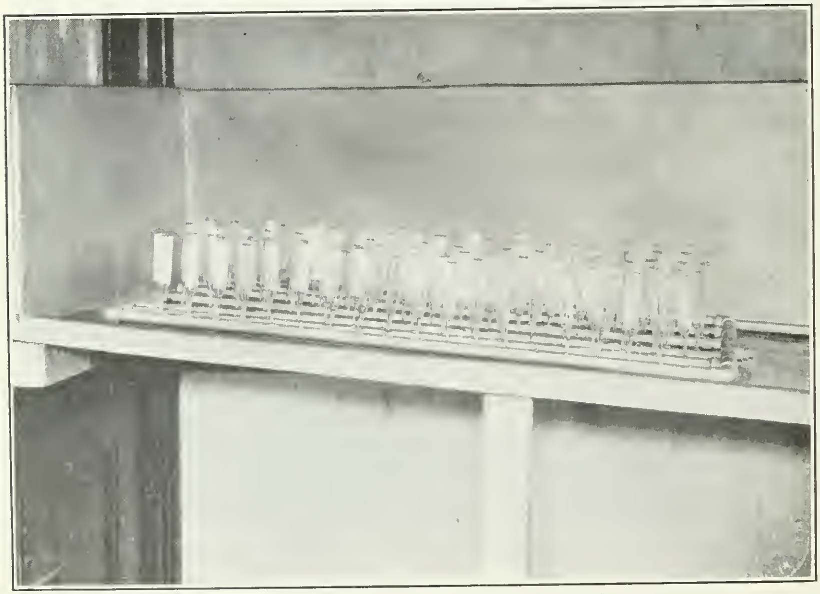


Fig. IV.—Washing of Ampules, which are inverted over Water Spouts.

366

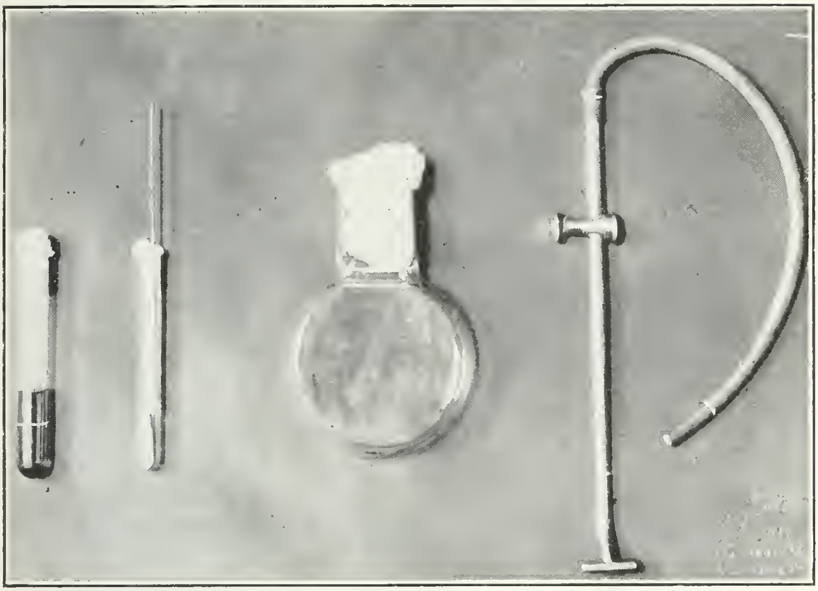


Fig. V.—Suspension for Inoculation, Swab, Kolle Flask and Vacuum Scraper.

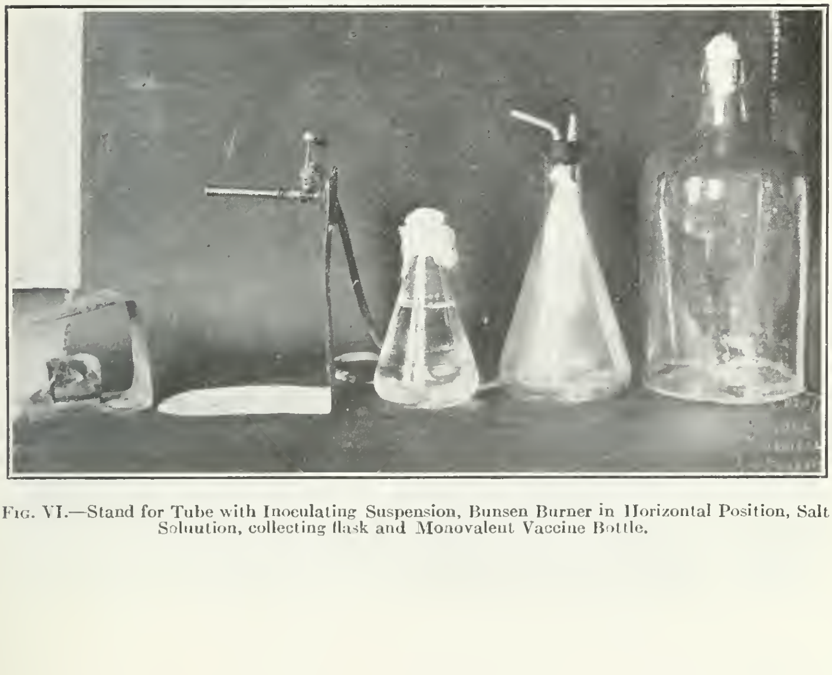


Fig. VI.—Stand for Tube with Inoculating Suspension, Bunsen Burner in Horizontal Position, Salt Soluution, collecting flask and Monovalent Vaccine Bottle.

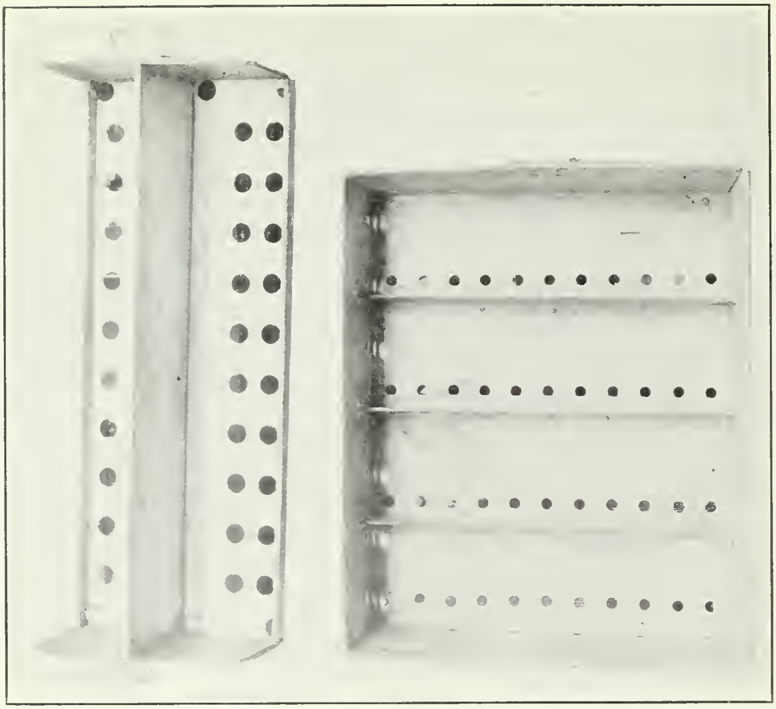


Fig. VII.—Galvanized Iron Section Rack and Crate

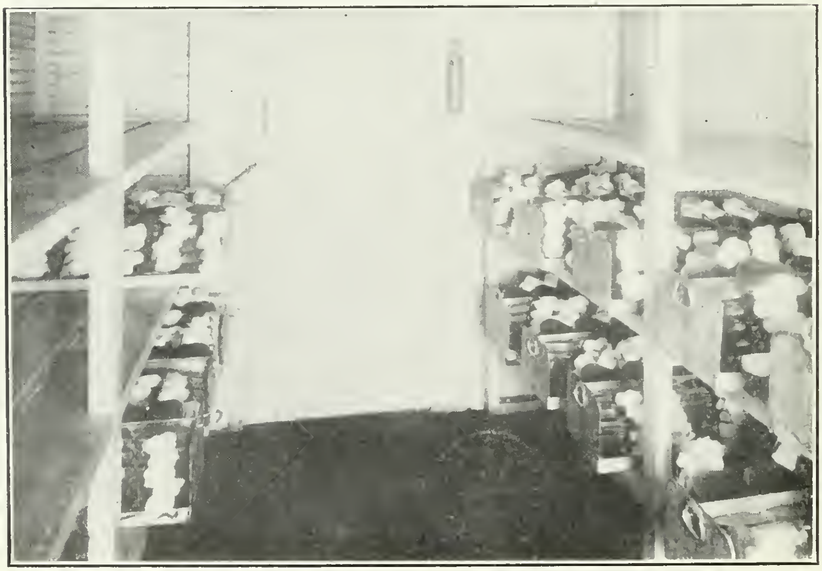


Fig. VIII.—Incubating Room with Section Racks Filled with Kolle Flasks.

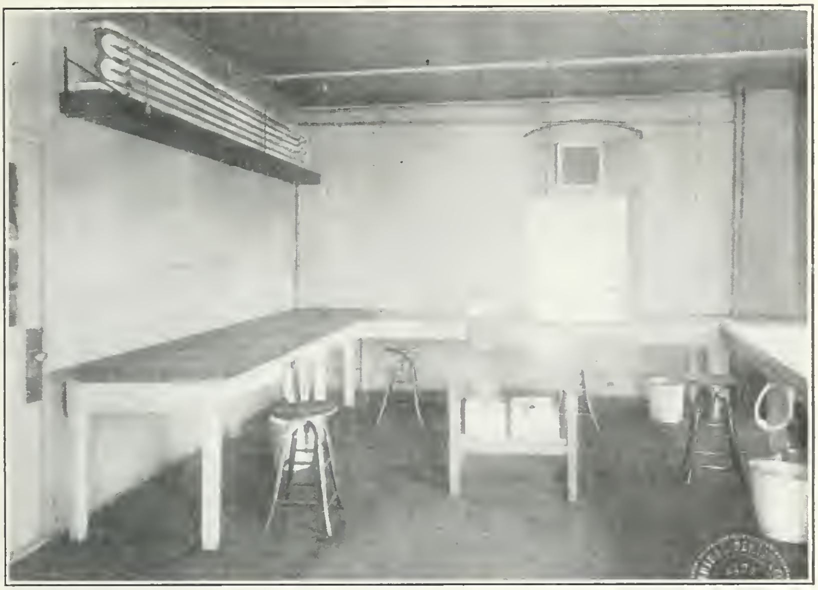


Fig. IX.—View of Inoculating and Wash Room Showing Outlet for Exhaust Fan in Window and Refrigerating Coils

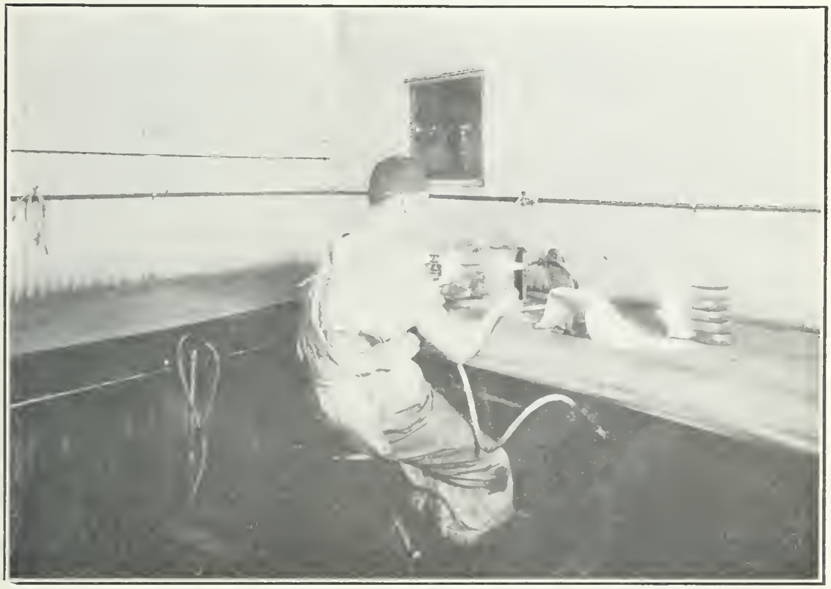


Fig. X.—Inoculating Kolle Flasks

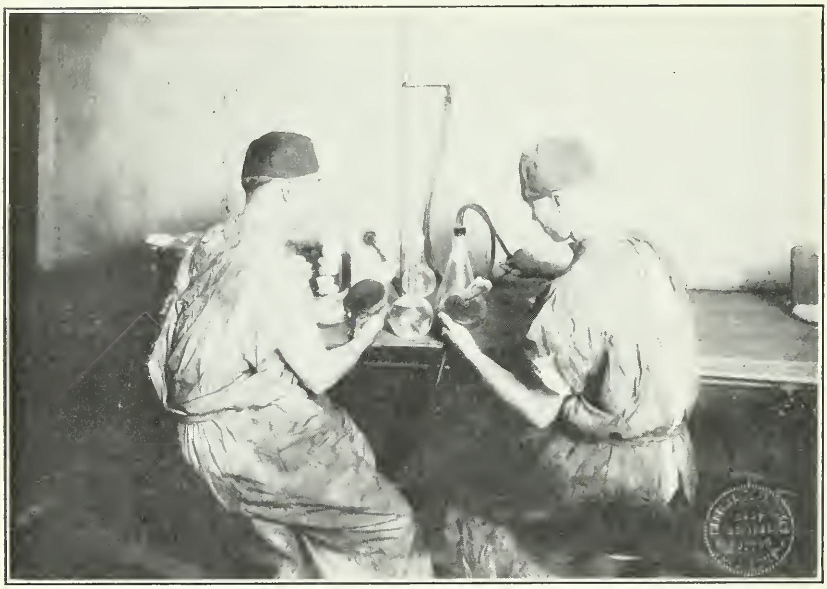


Fig. XI.—Washing and collecting vaccine. No. 1 is operating vacuum scraper, No. 2 is assisting.

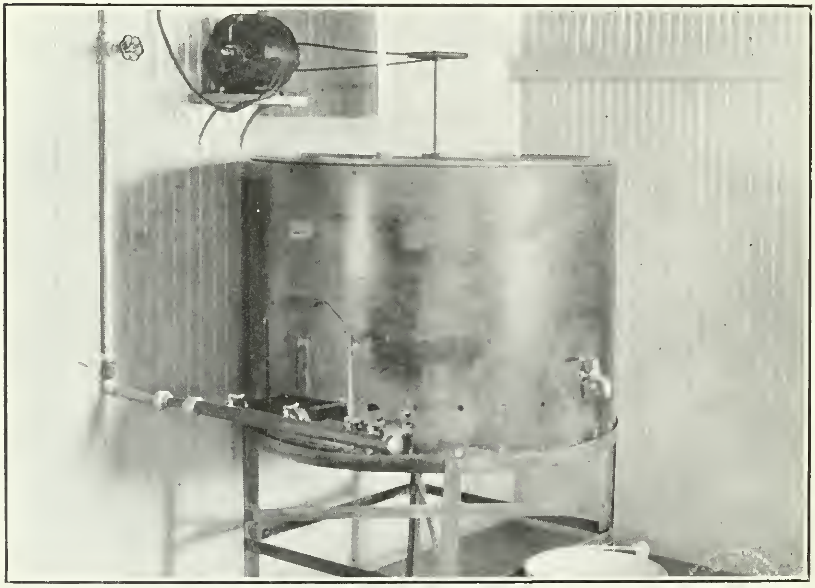


Fig. XII.—Water Bath With Motor and Thermometer

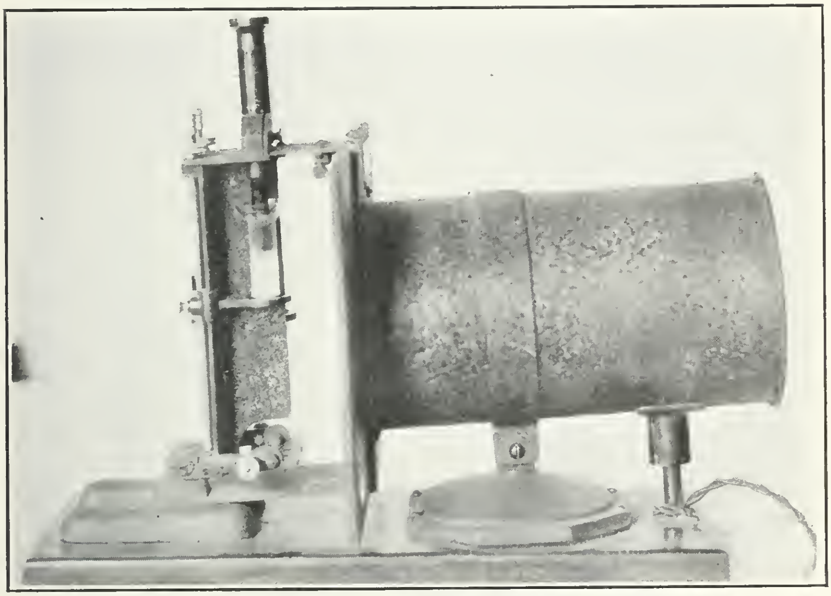


Fig. XIII.—Side View of Nephelometer Showing One Cup.

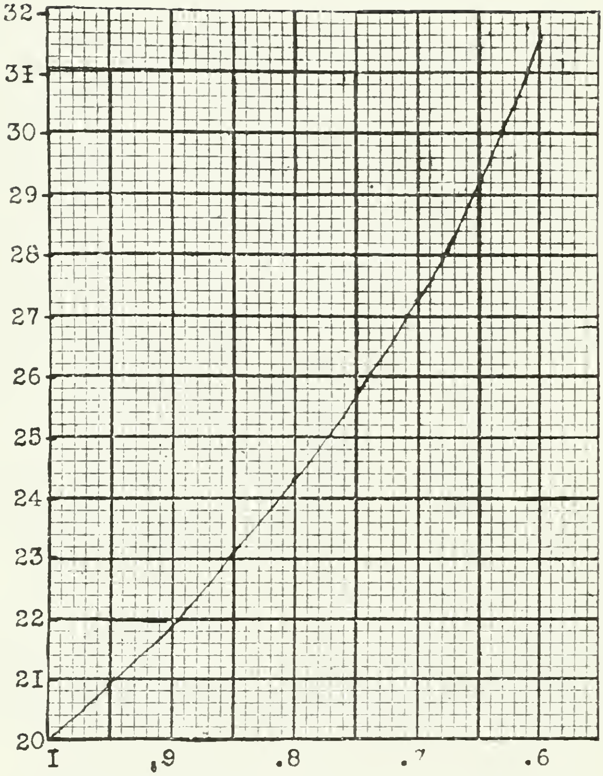


FIG. XIV.—Nephelometric curve for typhoid vaccine. Concentration of the standard, 1000 million bacilli per c. c. The millimeter readings are represented by the ordinates. The ratio of the concentration of the unknown to the standard is represented by the abscissae.

1.0=1,000 million bacilli per c.c.
.9= 900 million bacilli per c.c.
.8= 800 million bacilli per c.c.
.7= 700 million bacilli per c.c.
.6= 600 million bacilli per c.c.

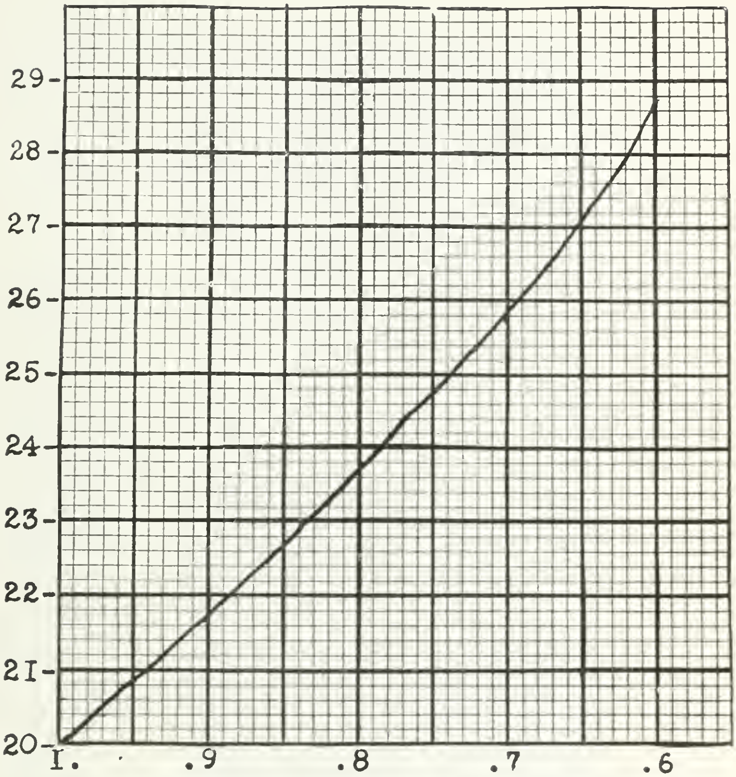
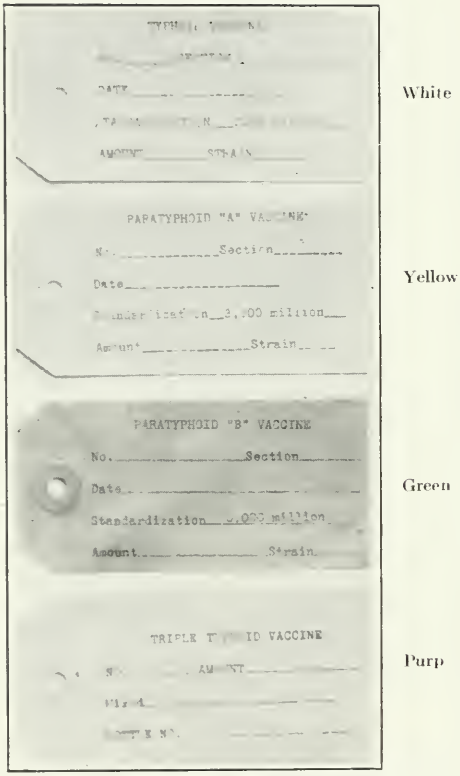


FIG. XV.—Nephelometric curve for paratyphoid—A and B Vaccine. Concentration of the standard, 2000 million bacilli per c.c. The millimeter readings are represented by the ordinates. The ratio of the concentration of the unknown to the standard is represented by the abscissae.

1.0=2,000 million bacilli per c.c.
.9=1,800 million bacilli per c.c.
.8=1,600 million bacilli per c.c.
.7=1,400 million bacilli per c.c.
.6=1,200 million bacilli per c.c.



PARATYPHOID "A" VACCINE
No. ______ Section ______
Date ______
Standardization 3,000 million
Amount ______ Strain ______

PARATYPHOID "B" VACCINE
No. ______ Section ______
Date ______
Standardization [illegible],000 million
Amount ______ Strain ______

Fig. XVI.—Cards Used for Labelling Bottles of Monovalent and Triple Vaccine.

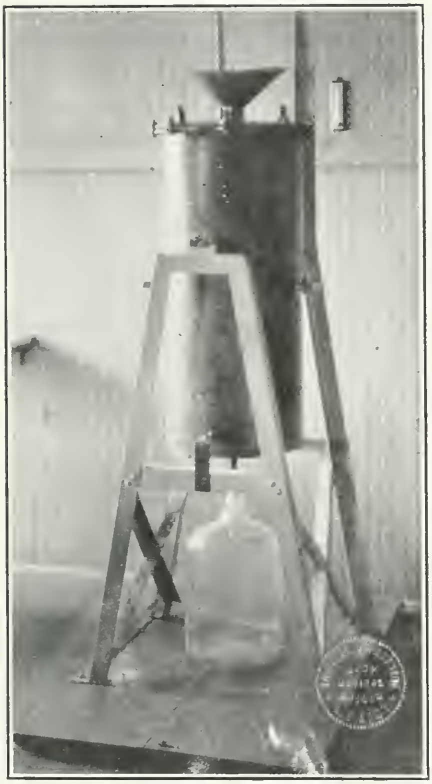


Fig. XVII.—Mixer with Funnel and Bottle for Drawing off Vaccine.

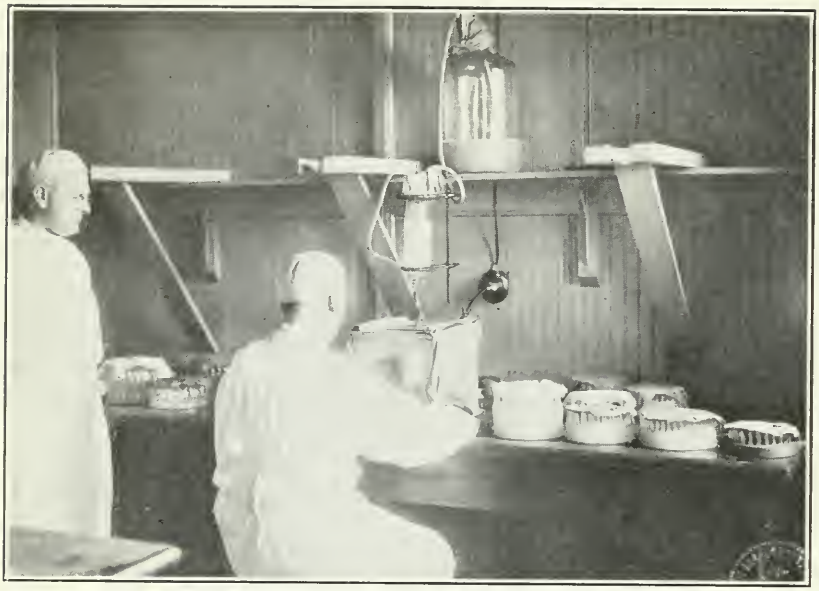


FIG. XVIII.—Ampulling. Note Apparatus, protection Box, Caps and Gowns, covered ampules.

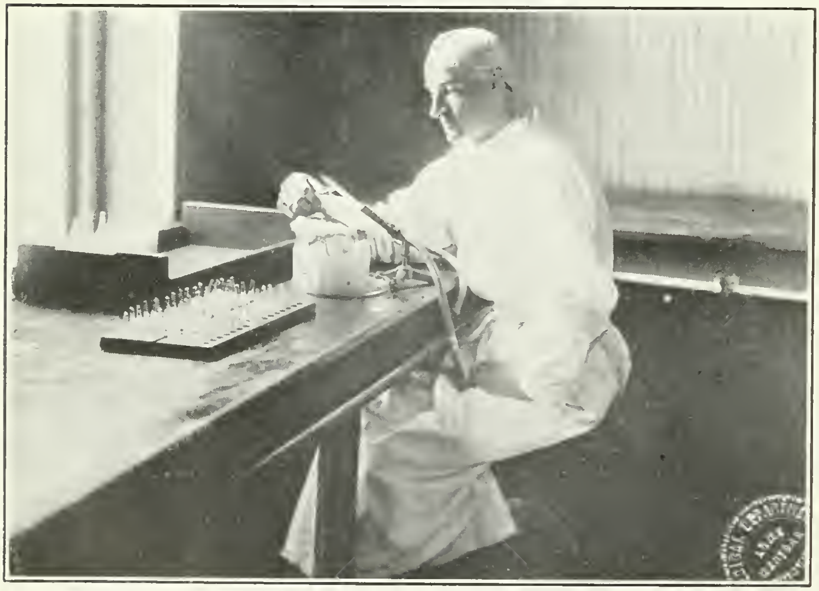


FIG. XIX.—Sealing Ampules. Note Ampules before and after Sealing.

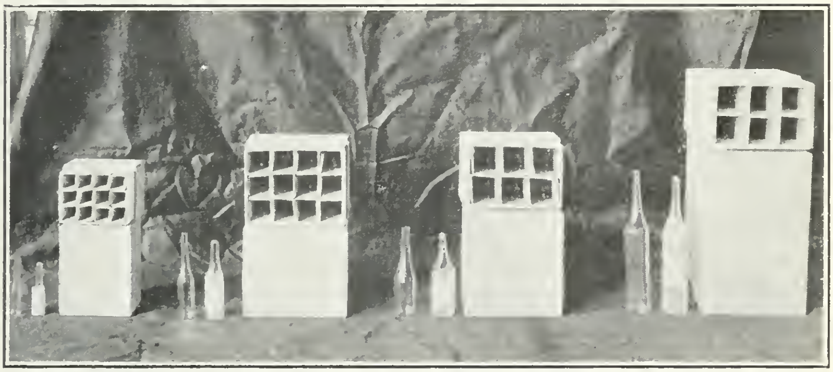
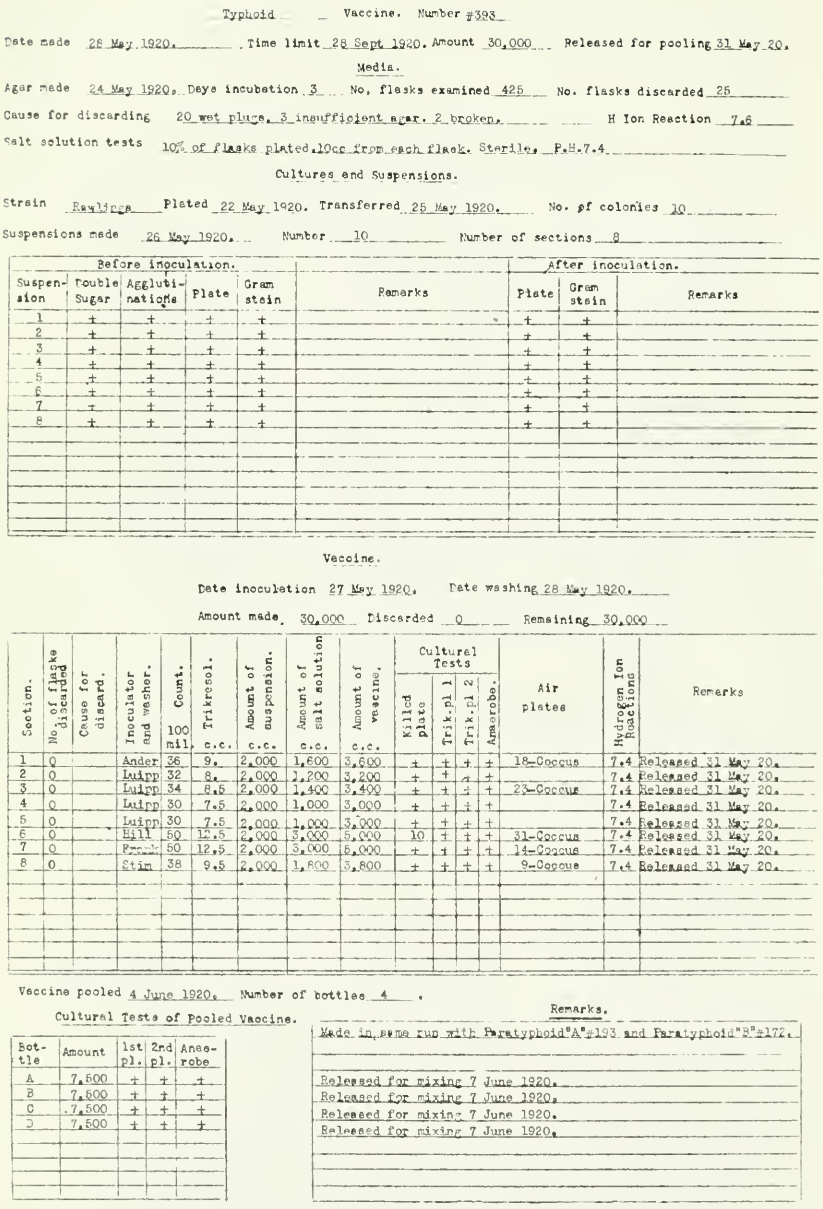


FIG. XX.—Card-Board Boxes and Unlabelled and Labelled Ampules, 1 c. c., 5 c. c., 10 c. c., 25 c. c



Typhoid Vaccine. Number #393

Date made 28 May 1920. Time limit 28 Sept 1920. Amount 30,000 Released for pooling 31 May 20.

Media.

Agar made 24 May 1920. Days incubation 3 No. flasks examined 425 No. flasks discarded 25

Cause for discarding 20 wet plugs. 3 insufficient agar. 2 broken. H Ion Reaction 7.6

Salt solution tests 10% of flasks plated. 10cc from each flask. Sterile. P.H.7.4

Cultures and Suspensions.

Strain Rawlings Plated 22 May 1920. Transferred 25 May 1920. No. of colonies 10

Suspensions made 26 May 1920. Number 10 Number of sections 8

Before inoculation.						After inoculation.		
Suspension	Double Sugar	Agglutinations	Plate	Gram stain	Remarks	Plate	Gram stain	Remarks
1	+	+	+	+		+	+	
2	+	+	+	+		+	+	
3	+	+	+	+		+	+	
4	+	+	+	+		+	+	
5	+	+	+	+		+	+	
6	+	+	+	+		+	+	
7	+	+	+	+		+	+	
8	+	+	+	+		+	+	

Vaccine.

Date inoculation 27 May 1920. Date washing 28 May 1920.

Amount made 30,000 Discarded 0 Remaining 30,000

Section.	No. of flasks discarded	Cause for discard.	Inoculator and washer.	Count. 100 mil.	Trikresol. c.c.	Amount of suspension. c.c.	Amount of salt solution c.c.	Amount of vaccine. c.c.	Cultural Tests				Air plates	Hydrogen Ion Reactions	Remarks
									Killed plate	Trik.pl 1	Trik.pl 2	Anaerobe.			
1	0		Ander	36	9.	2,000	1,600	3,600	+	+	+	+	18–Coccus	7.4	Released 31 May 20.
2	0		Luipp	32	8.	2,000	1,200	3,200	+	+	+	+		7.4	Released 31 May 20.
3	0		Luipp	34	8.5	2,000	1,400	3,400	+	+	+	+	23–Coccus	7.4	Released 31 May 20.
4	0		Luipp	30	7.5	2,000	1,000	3,000	+	+	+	+		7.4	Released 31 May 20.
5	0		Luipp	30	7.5	2,000	1,000	3,000	+	+	+	+		7.4	Released 31 May 20.
6	0		Hill	50	12.5	2,000	3,000	5,000	10	+	+	+	31–Coccus	7.4	Released 31 May 20.
7	0		Frank	50	12.5	2,000	3,000	5,000	+	+	+	+	14–Coccus	7.4	Released 31 May 20.
8	0		Stim	38	9.5	2,000	1,800	3,800	+	+	+	+	9–Coccus	7.4	Released 31 May 20.

Vaccine pooled 4 June 1920. Number of bottles 4 .

Cultural Tests of Pooled Vaccine.

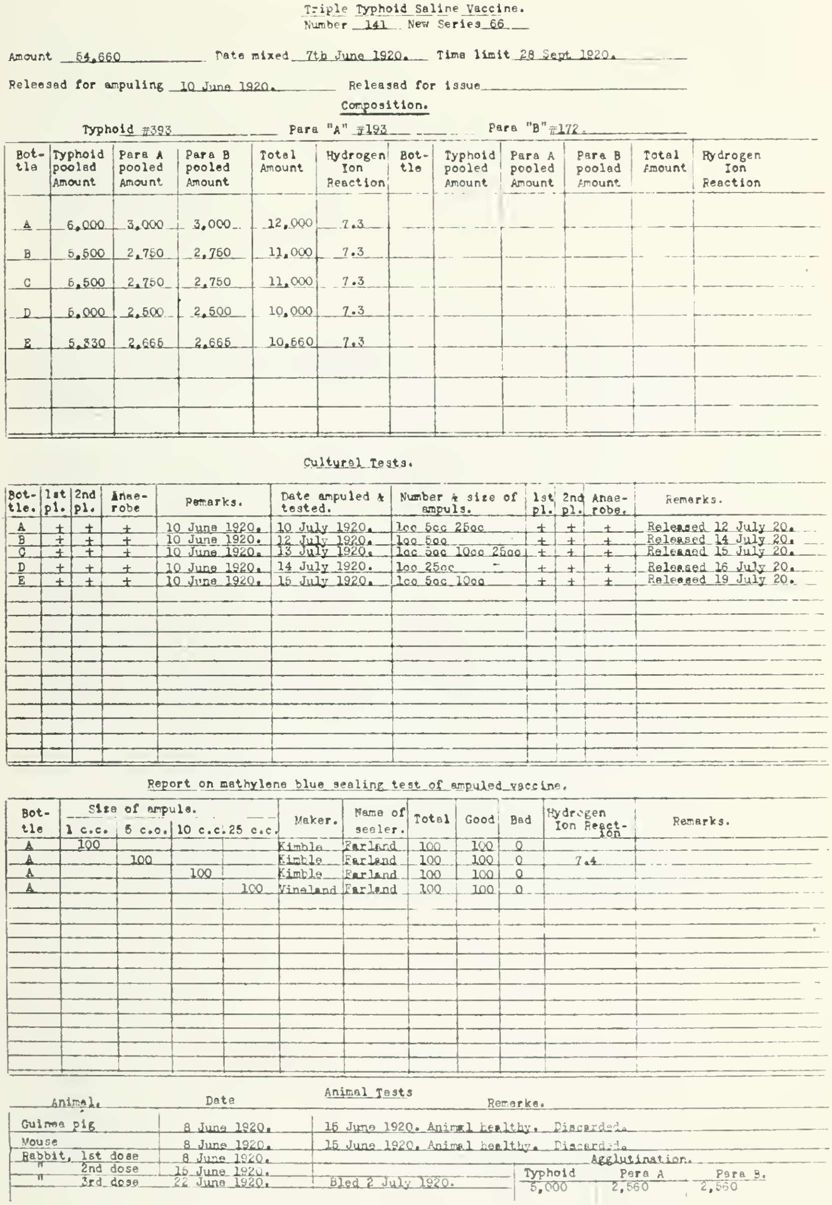
Bottle	Amount	1st pl.	2nd pl.	Anaerobe
A	7,500	+	+	+
B	7,500	+	+	+
C	7,500	+	+	+
D	7,500	+	+	+

Remarks.

Made in same run with Paratyphoid "A" #193 and Paratyphoid "B" #172.

Released for mixing 7 June 1920.
Released for mixing 7 June 1920.
Released for mixing 7 June 1920.
Released for mixing 7 June 1920.

FIG. XXI.—Monovalent Vaccine Record.



Triple Typhoid Saline Vaccine.
Number 141 New Series 66

Amount 54,660 Date mixed 7th June 1920. Time limit 28 Sept 1920.

Released for ampuling 10 June 1920. Released for issue

Composition.

Typhoid #393 Para "A" #193 Para "B" #172.

Bottle	Typhoid pooled Amount	Para A pooled Amount	Para B pooled Amount	Total Amount	Hydrogen Ion Reaction	Bottle	Typhoid pooled Amount	Para A pooled Amount	Para B pooled Amount	Total Amount	Hydrogen Ion Reaction
A	6,000	3,000	3,000	12,000	7.3						
B	5,500	2,750	2,750	11,000	7.3						
C	5,500	2,750	2,750	11,000	7.3						
D	5,000	2,500	2,500	10,000	7.3						
E	5,330	2,665	2,665	10,660	7.3						

Cultural Tests.

Bottle.	1st pl.	2nd pl.	Anaerobe	Remarks.	Date ampuled & tested.	Number & size of ampuls.	1st pl.	2nd pl.	Anaerobe.	Remarks.
A	+	+	+	10 June 1920.	10 July 1920.	1cc 5cc 25cc	+	+	+	Released 12 July 20.
B	+	+	+	10 June 1920.	12 July 1920.	1cc 5cc	+	+	+	Released 14 July 20.
C	+	+	+	10 June 1920.	13 July 1920.	1cc 5cc 10cc 25cc	+	+	+	Released 15 July 20.
D	+	+	+	10 June 1920.	14 July 1920.	1cc 25cc	+	+	+	Released 16 July 20.
E	+	+	+	10 June 1920.	15 July 1920.	1cc 5cc 10cc	+	+	+	Released 19 July 20.

Report on methylene blue sealing test of ampuled vaccine.

Bottle	Size of ampule.				Maker.	Name of sealer.	Total	Good	Bad	Hydrogen Ion Reaction	Remarks.
	1 c.c.	5 c.c.	10 c.c.	25 c.c.							
A	100				Kimble	Farland	100	100	0		
A		100			Kimble	Farland	100	100	0	7.4	
A			100		Kimble	Farland	100	100	0		
A				100	Vineland	Farland	100	100	0		

Animal Tests

Animal.	Date	Remarks.
Guinea pig	8 June 1920.	15 June 1920. Animal healthy. Discarded.
Mouse	8 June 1920.	15 June 1920. Animal healthy. Discarded.
Rabbit, 1st dose	8 June 1920.	
" 2nd dose	15 June 1920.	
" 3rd dose	22 June 1920.	Bled 2 July 1920.

Agglutination.

Typhoid	Para A	Para B.
5,000	2,560	2,560

Fig. XXII.—Triple Typhoid Vaccine Record

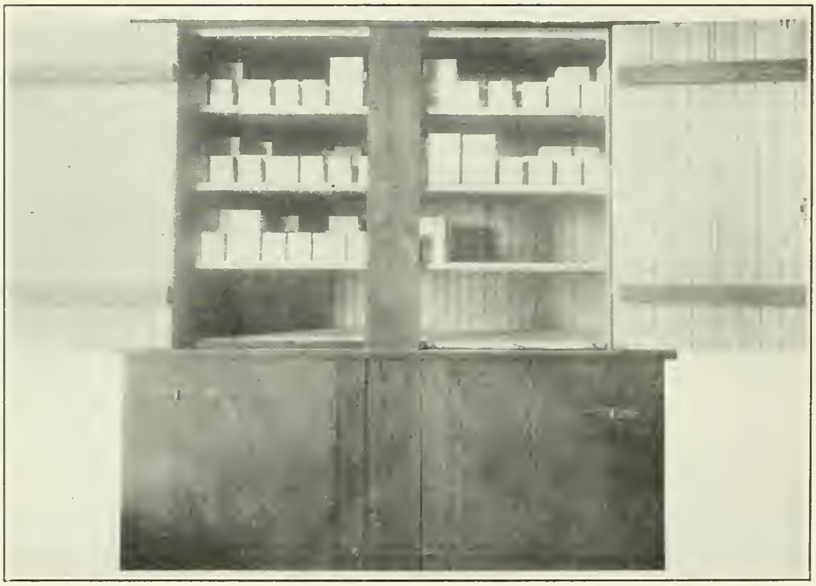


FIG. XXIII.—Cupboard with Lock, Showing Retained Samples Arranged in Series.

tube from the vacuum system. The lower end of this tube is flanged and covered with a gauze filter. The other hole carries another glass tube for attachment to a rubber tube leading to the vacuum scraper. The lower end of this glass tube is flanged and covered with several layers of gauze which serves as a vaccine filter. The collecting flask with its stopper and tubes in place is covered with cotton gauze protector, and is autoclaved at 15 pounds for one hour. A cotton gauze stopper is sterilized in a muslin wrapper.

G. Prepare sterile 2000 c.c. graduates.

H. Prepare sterile graduated 25 c.c. pipettes.

I. Wrap the vacuum scraper with rubber tube in a towel and sterilize in autoclave.

J. Large glass jars, earthen jars and wash tubs are needed for disinfecting solutions; 2 per cent compound cresol solution for used glassware.

K. Prepare two sterile 8-liter bottles for diluting and pooling each section, and one-half as many 12 to 16 liter bottles for the mixed vaccine.

L. Labels for these bottles are in different colors: White for monovalent typhoid vaccine; yellow for Para A vaccine; green for Para B vaccine; and purple for triple typhoid vaccine. Each label has a place for the lot number, the letter of the bottle, the contents and date of preparation. (Fig. XVI.)

M. Purchase 1 c.c., 5 c.c., 10 c.c. and 25 c.c. ampules according to specifications (par. 19). Wash, dry, pack in tin boxes 9 x 9 x 9 inches. Sterilize in hot air at 180° for two hours. Seal boxes with paper label after sterilization.

4. PLANTING (FIG. X.)

A. In incubating room flame plugs of flasks *en masse* on each side of rack; smother quickly with wet tricresolized towel.

B. In inoculating room examine each flask for sterility. Discard flasks with defective stoppers or cracks. Infections are rarely found.

C. Flame mouth of flasks and inoculate once with swab from tube of inoculating suspension avoiding water of condensation. Invert on slant and incubate at 37° for 24 hours.

D. Make one plate of suspension remaining as check of contamination during planting. Contaminations are rarely found.

E. Expose one agar plate near each tube of suspension as indication of air infection. These plates usually should show a few colonies of air staphylococci and occasionally a few colonies of spore-bearing bacilli.

F. Disinfect used material.

5. WASHING AND COLLECTING. (FIG. XI.)

The man who inoculates the section (1) and one assistant (2) act as a team.

A. No. 1 will connect up vacuum scraper and vacuum collecting flask and turn on exhaust.

B. The inoculator will examine each flask with great care and discard all flasks which show evidence of any contamination. This is the most important step in the technic as regards the purity of the final product. About 1 per cent of flasks is usually discarded.

C. Number 2 will remove plug, carefully flame mouth of flask and pour in about 40 c.c. salt solution. Number 1 will then take flask, insert sterile vacuum scraper and scrape off growth in the salt solution. Aspirate contents by pressing valve, avoiding aspiration of air as much as possible.

D. No. 1 will disconnect scraper and vacuum tube and make quantity of suspension up to 40 c.c. per flask with salt solution. Plug collecting flask with sterile cotton and gauze stopper. Take 5 c.c. from every other flask in test tube for counting.

E. Disinfect vacuum scraper, rubber stoppers and used flasks.

6. HEATING. (FIG. XII.)

Heat the collecting flasks containing the suspensions in a water bath which is kept at uniform temperature throughout by an electrically run paddle. Run a control of salt solution containing a thermometer and keep another thermometer in the water of the bath. Take care that the water in the bath is not below the level of the suspensions, and that no suspension is splashed on the sides of the flask above the water level. Start time when control reaches the desired temperature.

Heat the typhoid bacilli in a water bath for one hour at 53° C., the paratyphoid A bacilli for one hour at 54° C., and the Para B bacilli for one hour at 55° C. The temperature should not vary more than 0.5° from the figures given. Cool suspensions at room temperature.

7. STANDARDIZATION

A. COUNTING BACTERIA IN CHAMBER FOR STANDARDS

1. Place well-mixed samples of the suspension from every other section in small sterile conical containers.

2. Dilute a portion of this in a red cell-counting pipette. (Diluting fluid; 2 per cent phenol solution, 30 c.c.; sat. aq. solution of thionin one c.c. Mix and let stand 15 minutes, then filter.) This diluting fluid kills the bacilli and stains them a dark blue.

3. Count the number of bacteria in a Halber counting chamber in the same manner in which red blood cells are counted.

4. Estimate the number of bacteria per cubic millimeter of suspension. (The Halber counting chamber is 0.02 mm. deep, the ordinary blood counting chamber 0.1 mm. Hence the capacity of the Halber chamber is one-fifth that of the blood counting chamber.)

5. The average count for a typhoid suspension is 4,000 M.; for Para A, 7,000 M., and for Para B, 8,000 M. per c.c.

B. NEPHELOMETRIC METHOD OF STANDARDIZATION

(Figs. XIII, XIV, XV.)

1. Monovalent standards are made by accurately counting and recounting a sample and by diluting a suspension so that the standards contain one billion typhoid bacilli per c.c., two billion paratyphoid A bacilli per c. c., and two billion paratyphoid B bacilli per c.c.

2. Procedure: Place ten or twelve c.c. of the standard in the cup on the left side of the instrument and a like amount of a dilution of suspension from a collecting flask in the cup on the right. Raise the left cup until the vernier scale on the back of the instrument is set at 20 millimeters. Raise the cup on the right until the light from both cups through the eyepiece is exactly equal on both sides of the field. The reading of the right vernier is noted and the calculation made from the curve, as outlined below.

3. Calculation: A nephelometric curve is made by placing the standard in the left cup, which is then set at 20 millimeters. Dilutions of .9, .8, .7 and .6 of the standard are placed on the right and read against the undiluted standard. The readings thus obtained are plotted on cross section paper and a curve drawn through the established points. (See Figure No. XV). This curve can then be used for all future work with that particular standard. Every part of this curve represents a certain number of bacilli per c.c. The millimeter reading of a dilution of suspension of unknown strength when applied to the curve will give the number of bacilli per c.c. in that dilution. This figure multiplied by the dilution would equal the number of bacilli per c.c. in the original suspension.

4. Examples:

(a) *Making standard for paratyphoid A vaccine.*

(Primary standard) A fresh vaccine is accurately counted by the counting chamber method.

Presuming that this vaccine is found to contain 6,600 million bacilli per c.c., then to 10 c.c. of the vaccine are added 23.00 c.c. of 0.85%

salt solution, which reduces it to 2,000 million per c.c. 6,600: 2,000: : X: 10 –X equals 33, the total volume; 33–10 equals 23, the volume of salt solution to be added. The dilution is recounted as a check.

(b) *Routine estimations*

1. The suspension to be counted is diluted to the approximate turbidity of the standard. It must come within the limits of the curve.

2. Presuming that an paratyphoid A suspension, that has been diluted to one part in four, gives a reading of 24.1 millimeters on the scale, reference to the curve shows that 24.1 mm. is equal to .775 of the 2,000 million per c.c. standard, or 1,550 bacilli per c.c. Therefore, 1,550 multiplied by four equals 6,200 million per c.c., which is the number of bacilli in the original suspension.

Notes:

All standards should be renewed once a month. This is done by diluting a freshly made suspension until it exactly matches the standard in the nephelometer.

The standard should be read against itself before each series of readings and the instrument adjusted by means of the adjustable scale on the back.

The readings can be made in ten minutes or less and the error should not be greater than 10 per cent plus or minus.

8. DILUTING

From the strength of the suspensions calculate the amount of saline which is to be added to make the vaccine of the required strength. The amount of saline added plus the amount of suspension determines the amount of tricresol needed to make the required 0.25 per cent. While the suspensions are being heated, determine their strength, label each bottle, put in the proper amounts of tricresol, one for each section, and with 2,000-c.c. graduates add the proper amount of saline so that when the suspension is added to it the vaccine will have the proper strength. Shake the tricresol in the saline until all is dissolved. Remove flasks from water bath, cool at room temperature and take a 10 c.c. sample with pipette for test. Then pour the suspension into its proper monovalent vaccine bottle. Let these stand at least 2 hours. Take 25 c.c. from each bottle after shaking for test. Make a PH determination on each section, using phenol red. The reaction should run about 7.4.

9. TESTING

1. Plate one c.c. of the heated suspension in 10 c.c. of agar.

2. Test eleven c.c. of the tricresolized vaccine from each bottle as follows:

A. Plate three c.c. in each of two agar plates.

B. Make an anaerobic culture by placing 5 c.c. of the vaccine into a tube of recently boiled glucose agar with Andrade indicator which has cooled to 45°C. Mix the vaccine well with the agar. Cover the agar with sterile liquid petrolatum.

Keep all the cultures of tricresolized vaccines at 37°C. for 48 hours and at room temperature for 24 hours. No. 1 plate should show a few colonies of the typhoid group and no others. The tricresolized vaccine plates should be sterile. If contaminated, re-test, and if second test shows contamination, discard all the vaccine. If sterile, release vaccine for pooling.

Keep the vaccines in the ice-box at about 20°C.

10. POOLING AND MIXING. (FIG. XVII.)

POOLING

Pour each bottle of monovalent vaccine of a lot through a sterile protected funnel into the mixer. Revolve the mixer and draw off the pooled vaccine into fresh sterile 8-liter bottles. The same mixer is used without fresh sterilization for the three monovalent vaccines. Take 50 c.c. from each pooled bottle and culture separately. Make four plates of 3 c.c. each, and two anaerobic cultures of 5 c.c. each. Incubate 48 hours at incubator temperature and 24 hours at room temperature. Contaminations are occasionally found at this stage which have not been detected previously.

MIXING

Pour each pooled monovalent into the mixer in a proportion of two parts of typhoid vaccine to one part of Para A vaccine and one part of Para B vaccine. Revolve the mixer as in the pooling, and draw off the mixed vaccine into 18-liter bottles. Remove 25 c.c. with a pipette for culture and PH reading. Make 2 plates of 3 c.c. each and one anaerobic culture of 5 c.c. Contamination was detected at this stage in one instance.

11. AMPULING. (FIG. XVIII.)

Take a bottle of mixed released vaccine from the ice-box to the ampuling room. Shake well. Remove the tinfoil and the cotton stopper and place a sterile siphon in the bottle. The siphon consists of (1) a glass tube on one end of which is a spiral of iron wire which is wound around the tube, bent at right angles and covered with several layers of gauze to act as a filter; (2) a rubber tube is attached to the upper end of the glass tube and leads to a double perforated rubber stopper. The rubber stopper fits into the mouth of a large (1,000 c.c.) separatory funnel. The other hole in the rubber stopper is fitted with a glass tube with a cotton plug to which is attached a piece of rubber tubing to start the siphon. At the other end of the glass separatory funnel is attached a rubber tube which carries a capillary pipette as a filling tube. Keep all this apparatus in large glass jars in 1.0 per cent tricresol while not in use. Before filling ampules run a small amount of vaccine through the apparatus to remove the excess of tricresol. Prepare protective glass box by washing it with disinfectant solution and by adjusting damp cloths.

Number each tin box of ampules as used for each lot. Bring boxes into the ampuling room. A worker wearing sterile rubber gloves will remove the ampules and set them up in large glass petri dishes, or into special wooden racks. Cover ampules with a piece of sterile gauze soaked in 2 per cent compound cresol solution. The ampuller will fill ampules from siphon under glass box and sealers will immediately seal them in the flame of a blast lamp. Let ampules cool at room temperature.

Shake all sealed ampules up side down to test for leaks. Heat several of each size which has passed inspection to 50°c, then place in cold mythelene blue solution and wash off. If the vaccine appears blue some cracks have not been detected. This test is a check on the inspection of ampules. Less than 1 per cent are usually found cracked (U. S. P. H. test).

12. RE-TESTING

The vaccine is re-tested three times, once after pooling, once after mixing as above, and once after ampuling. From the ampules of each tin box take at least 15 c.c. for testing. From the 5–10–25 c.c. ampules take 5 c.c. from each of three ampules and pool. Plate 3 c.c. into each of 2 plates and 5 c.c. into an oil anaerobic culture, as under testing. Read cultures after 48 hours' incubation (24 hours at 37°, 24 hours at room temperature). No contaminations have ever been detected at this stage. If these tests are sterile release the vaccine for shipment.

13. ANIMAL TESTS

Take 10 c.c. from each bottle of mixed vaccine of each lot. Pool these samples and use for animal inoculation after warming in incubator for one half hour.

Inoculate 1.5 c.c. of this pooled mixed vaccine intraperitoneally into a guinea pig as a test of toxicity.

Inoculate 0.5 c.c. subcutaneously into a rabbit for agglutination test.

Inoculate 0.5 c.c. intraperitoneally into a mouse as a check on overdose of tricresol. Observe these animals for 7 days and if normal discard the mouse and guinea pig and release the vaccine for ampuling. If any animal dies within 7 days, autopsy it and inoculate another one. Animals occasionally die of pneumonia.

Hold the rabbit and give 1.0 c.c. of the vaccine intravenously at one week intervals for 2 more doses. Ten days after the last dose test the blood serum of this rabbit for agglutinins.

The agglutination averages for Typhoid 1 to 10,000, for Para A 1 to 5,000, and for Para B 1 to 5,000. In case the agglutinins are not present up to 2,500, run another animal through.

Vaccine has never been rejected on account of toxicity or excessive amount of tricresol, but one lot has been rejected on account of low titre agglutination.

The dilutions run from 1 to 40 to 1 to 20, 480. The agglutinating suspension used is a monovalent vaccine as made for mixing. Incubate the tubes two hours at 37° and at room temperature overnight and read with a magnifying glass the next morning. They generally read one dilution higher than if read immediately.

14. RETAINED SAMPLES. (FIG. XXIII)

For protection and reference keep under lock and indefinitely samples of all vaccines issued. Occasionally a lot of vaccine is reported contaminated by the user, but a re-culture of the retained samples has always vindicated the laboratory. From the sealed ampules of each tin box save one full package of ampules. Add 0.5 c.c. phenol red to 10 c.c. ampules of each lot and seal. The reaction should read about 7.2 Ph. Retain this ampule for effect of glassware on reaction.

15. LABELING

On each sealed ampule paste label showing lot number, bottle letter, tin box number and date made. The date of expiration is four months after date made for the United States and six months, for foreign countries.

16. PACKING. (FIG. XX)

Put ampules in cardboard boxes with cardboard compartments. Pack with sawdust. Put in circular of directions. Label boxes as follows:

TRIPLE TYPHOID SALINE VACCINE
6–10 c.c. ampules
Batch No. . . . .
1st dose ½ cc. 2d and 3d doses each 1 c.c. subcutaneously. SHAKE WELL BEFORE USING. Store in ice-box.
Date made. . . . .
Army Medical School, Washington, D. C.

Boxes contain twelve 1 c.c., twelve 5 c.c., six 10 c.c. and six 25 c.c. ampules.

17. RECORD. (FIGS. XXI AND XXII)

Fill out record blanks of monovalent and mixed vaccines and preserve indefinitely for protection and for data.

18. YEARLY RECORD SHOWING LOSS FROM CONTAMINATION

Year	Lots	Sterile	Contaminated	Per cent contaminated	Amount sterile in liters
1909	21	16	5	24	40
1910	23	13	10	43	109
1911	43	30	13	30	430
1912	24	22	2	8	458
1913	18	17	1	5.9	407
1914	31	30	1	3.2	551
1915	61	58	3	4.9	532
		Sections			
1916	167	156	11	6.5	1,540
1917	2,966	2,435	531	17.8	14,087
1918	3,603	2,470	1,133	31.4	12,820
1919–20	871	757	114	13.0	2,018
(Apr.-Apr.)					32,992

19. SPECIFICATIONS FOR VACCINE AMPULES, MEDICAL DEPARTMENT, U. S. ARMY

Laboratory specifications No. 1, June 20, 1920.

By Matthew A. Reasoner, Major, M.C., U.S.A.

Glass to be a highly insoluble chemical glass which can be readily worked with a gas flame.

Completed ampules must withstand the following tests: After thoroughly cleaning with distilled water, fill the ampules with CO_2 free, distilled water containing 2 or 3 drops of standard phenolphthalein indicator to each 100 c.c. Then heat at the temperature of boiling water for one hour. The water in the ampules shall show no particle of scale and shall be colorless or of only a slight pink color (color must be discharged by the addition of not more than 0.1 c.c. N/10 acid to 100 c.c. water.)

Ampules shall be well annealed, the glass evenly distributed and the ampules as a whole well finished. Ampules shall have a flat base at right angles with the body.

For the purpose of description, the body of the ampule shall be considered to be that portion from the base up, which is surrounded by vertical walls. The neck shall constitute the remaining portion of the ampule. The slope from the body to the most distant part of the neck shall be gradual and symmetrical, and the ampule shall be one piece of glass. It is required that the average external dimensions shall approximate those given below. Under the table of permissible variations, it is not intended that in the same ampule the height and diameter of the body may both be plus variations to the limit, or both minus variations to the limit. The midneck diameter is to be taken halfway between the junction of the neck and body and the orifice of the ampule.

1 *c.c. ampules*

	Average	Minimum	Maximum
Height over all	50 mm.	45 mm.	55 mm.
Diameter, base	10 mm.	9 mm.	11 mm.
Height, body	20 mm.	18 mm.	22 mm.
Diameter, free end of neck	5 mm.	4 mm.	6 mm.
Mid-neck diameter	6 mm.	5 mm.	7 mm.
Height of neck	30 mm.	27. mm.	33. mm.
Weight	1.75 gm.	1.5 gm.	2.2 gm.

5 *c.c. ampules*

	Average	Minimum	Maximum
Height over all	68 mm.	66 mm.	72 mm.
Diameter, base	17 mm.	15.5 mm.	18 mm.
Height, body	28 mm.	27 mm.	30 mm.
Diameter, free end of neck	6 mm.	5 mm.	7 mm.
Height, neck	4.0 mm.	38 mm.	42. mm.
Mid-neck diameter	7.5 mm.	6 mm.	8.5 mm.
Weight	4.88 gm.	4 gm.	5.5 gm.

10 *c.c. ampules*

	Average	Minimum	Maximum
Height over all	75 mm.	70 mm.	80 mm.
Diameter, base	20 mm.	18 mm.	22 mm.
Height, body	33 mm.	30 mm.	36 mm.
Diameter, free end of neck	7 mm.	6 mm.	8 mm.
Mid-neck diameter	9 mm.	8 mm.	10 mm.
Height, neck	42 mm.	40 mm.	44 mm.
Weight	8.25 gm.	6 gm.	10 gm.

25 *c.c. ampules*

	Average	Minimum	Maximum
Height over all	130 mm.	120 mm.	140 mm.
Diameter, base	23 mm.	22 mm.	25 mm.
Height, body	75 mm.	70 mm.	80 mm.
Diameter, free end of neck	7 mm.	6 mm.	8 mm.
Mid-neck diameter	10 mm.	9 mm.	11 mm.
Height, neck	55 mm.	50 mm.	60 mm.
Weight	13.5 gm.	10 gm.	15 gm.

Ampules shall be packed according to the following directions: first in well made pasteboard cartons, then the cartons in wooden containers. 1 c. c. ampules shall be packed vertically in rows (one horizontal layer only), with strips of pasteboard between rows and an adequate amount of paper or soft packing material over the top to protect the open ends from injury. 5 c. c. ampules shall be wrapped four together in paper and packed horizontally in pasteboard cartons with an adequate amount of paper or soft packing material over the top to protect from injury. 10 and 25 c. c. ampules shall be wrapped separately in paper and packed horizontally in cartons with an adequate amount of paper or other satisfactory packing material over the top to protect from injury.

	Number of ampules to carton	*Number of cartons to case*
1 c. c.	500	58
5 c. c.	100	80
10 c. c.	100	50
25 c. c.	50	50

A variation of not more than 10 per cent will, if necessary, be permitted in the number of cartons to the case, but each size of ampules must be packed without variation in a standard case containing a standard number of ampules.

The wooden containers shall be new and made from sound lumber, with not less than one-half inch sides and three-fourths inch ends, finished at least on one side and tongued and grooved. Boards shall not be less than 3 inches in width and have no knots greater than one-third the width of the board. The ends of boxes shall be cleated. Iron strapping shall be applied under compression in three dimensions.

Upon each box will be stencilled the contents of the box, the name of the manufacturer, the number of the contract or purchase order and date of same.

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ILLUSTRATIONS

Fig. I. Floor Plan, Typhoid Vaccine Department.
II. Preparation Room; Hot Air Sterilizers, Autoclaves, Kettles for Media.
III. Kinyoun Sterilizer used for Autoclaving.
IV. Washing of Ampules.
V. Suspension for Inoculation, Swab, Kolle Flask and Vacuum Scraper.
VI. Stand for tube with Inoculating Suspension, Bunsen Burner in Horizontal Position, Salt Solution, Collecting Flask and Monovalent Vaccine Bottle.
VII. Galvanized Iron Section Rack and Crate.
VIII. Incubating room with Section Racks Filled with Kolle Flasks.
IX. View of Inoculating and Wash Room, Showing Outlet for Exhaust Fan in Window and Refrigerating Coils.
X. Inoculating Kolle Flasks.
XI. Washing and Collecting Vaccine.
XII. Water Bath with Motor and Thermometer.
XIII. Side View of Nephelometer Showing one Cup.
XIV. Nephelometric Curve for Typhoid Vaccine.
XV. Nephelometric Curve for Paratyphoid A and B Vaccine.
XVI. Cards used for Labeling Bottles of Monovalent and Triple Vaccines.
XVII. Mixer with Funnel and Bottle for Drawing off Vaccine.
XVIII. Ampulling.
XIX. Sealing Ampules.
XX. Cardboard Boxes and Unlabeled and Labeled Ampules.
XXI. Monovalent Vaccine Record.
XXII. Triple Typhoid Vaccine Record.
XXIII. Cupboard with Lock, Showing Retained Samples Arranged in Series.

SOME OBSERVATION ON OUR WAR EXPERIENCES WITH FACE AND JAW INJURIES

By VILRAY PAPIN BLAIR, A.M., M.D., F.A.C.S.

A REVIEW of the treatment of injuries of the face and jaws has been selected as the subject to be presented for your discussion because the experiences in organization, preparation and technic gained in the late war not only has a bearing upon civilian practice but also the summed up judgment of this body should be a valuable guide to those coming after us, if the world again be so unfortunate as to engage in another such conflict.

The two fundamental principles upon which was based the preparation of this work by the Surgeon General of the Army were that the work could only be carried out to its highest efficiency by close coöperation of surgeons and dental surgeons and that proper treatment should be instituted early and be continuously carried out on systematic lines.

Both the character of battle wounds and the circumstances of their treatment necessitate that they at least pass through the hands of the surgeon but the earlier the dental surgeon is associated in the work, the better. Except for intermaxillary wiring, only the dental surgeon is equipped to splint a fractured jaw and it is the latter who will ultimately carry the major part of the burden in the greater number of cases, but intelligent coöperation is essential throughout the whole treatment.

To carry out the designs of the Surgeon General, it was necessary to have a large personnel, both surgeons and dental surgeons, who had received some special instruction in the general plan proposed so that teams would be available in every advanced, intermediate and base hospital to which the wounded would be brought, and an efficient, standard equipment was hardly of secondary importance.

You are all familiar with the plans instituted; failure of realization to the fullest extent was not due to want of coöperation of the medical or dental professions, either in civilian life or in the Army, but to the exigencies of the war. Where the plans actually fell short, disaster was averted by the splendid spirit of the personnel who at any time and anywhere made ingenuity and enthusiasm compensate for material and conveniences when either or both of the latter were lacking.

In general, early treatment was not a new idea. Before we had entered the war, the Allies had pushed their advanced hospitals up within the firing zone because they had learned that whether their hospitalization resulted in an 80-per cent death rate or 80 per cent of the wounded returned to duty depended mainly upon how early efficient treatment was instituted. When we entered the war, they had their plan of early treatment developed to a perfection which we never attained in any but the maxillo-facial injuries, and here they were handicapped for want of a central organization and a sufficiently large personnel to distribute throughout all hospitals. The work done at the various maxillo-facial centers was of the best order but the cases reached these centers after the ideal time for the institution of treatment had passed.

If I had the planning for the care of these injuries in another war, I would not change the general plan projected in the Office of the Surgeon General in but one particular and that would be to have each surgeon and each dental surgeon, selected to be entrusted with this work, carry his emergency equipment with him as his personal baggage with the understanding that his final assignment to this work would depend upon his ability to keep this available.

Transportation is the greatest problem in war and everyone participating who has any grasp of the situation is primarily concerned in getting his essential paraphernalia to its seat of operation.

We learned to our bitter sorrow that having the most complete equipment the nation and the government coöperating could provide, buried in some base was no help to those who were caring for the wounded. Those concerned with the greater problems regard first, men, next munitions, then food, all other considerations being secondary. After two years of close observation of the conditions, circumstances and temperament that go to make up an American Army, I cannot conceive of an organization so perfected in detail that the ultimate distribution of special equipment of any kind can be assured when entire dependence is placed upon the general plan of transportation. A few pounds of essentials stowed in his personal baggage would have been worth infinitely more to the dentist or the general surgeon than the several hundred pounds allotted that in time would have become available.

Regardless of the shortcomings of the late incumbent, the plan of having a director for this work, who is in close touch with both the chiefs of the surgical and dental divisions, is essential to the proper conduct of the work. In no other way can the continuity of the treatment be maintained and for the same reason, area consultants who are in touch with the general plan of treatment and of evacuation are an equal necessity.

At advanced hospitals it is rarely possible to make any segregation or selection of cases. Rapid evacuation is the prime military necessity and nothing can be allowed to interfere with it, therefore these wounds can receive early treatment of a special character only by having those equipped to give such treatment available at every advanced hospital.

In order to be able to meet emergencies, the supervising dental surgeon of the area should have at his disposal men who can be placed wherever the exigencies demand. The organization of an advanced hospital did not make it practicable to assign, by a general order, special surgeons to this work in these advanced hospitals, but the dental surgeon on duty could go from table to table to work with whatever surgeon to whom a maxillo-facial case fell. As a matter of fact, however, in most of the advanced hospitals that had in the personnel a dental surgeon who was capable of doing the work, sooner or later a local order was issued that assigned all such cases to his care and, at times, the work he was called upon to do was a tax almost beyond human endurance.

In the Base and Intermediate Zone Hospital Centers it is practicable to concentrate these cases into one hospital which economizes both personnel and equipment, facilitates administration and greatly adds to the efficiency of the treatment. It is not practicable to immediately send every special type of case to a special hospital as soon as it arrives at the center and any hard and fast order will produce confusion and resentment but, given a little time, all except multiple wounds can be concentrated and the surgeon in charge of each special service can serve as the consultant for the center in his branch and with a little tact will have no difficulty in seeing all cases and of transferring them to the limit of physical possibility.

If maxillo-facial cases are to be evacuated home from over-seas, great advantage will be derived from concentrating them on certain transports with a specially trained dental officer in charge which will not only save interruption in treatment but also prevent unnecessary interference with the splinted cases.

Cases arriving home should be immediately sent to special centers already equipped with adequate personnel and material and these centers should be so distributed that the wounded soldier will be within reasonable distance from their homes.

The special means provided by the Surgeon General for making pictoral and relief records of these cases should be of inestimable value for study and teaching in the future; but the artist and sculptor working in coöperation with the surgeon are essential to doing the best plastic surgery. Plastic surgery should aim at an exact end. The pencil and brush artist can make a stroke and then erase it at will, the sculptor cannot do this, therefore, those of less genius than Phidias are compelled to make a model in clay and only when this is perfected do they attempt to work it in the marble, and the marble block must contain sufficient material. When Michael Angelo undertook the creation of his David, he found that his block of marble was not sufficiently large to permit of the reproduction of his first conception and he had to make another model that corresponded to his marble. Similarly, as in the damaged face, the available material may be limited, the sculptor and the surgeon must pre-determine the character of repair that is possible and model the prototype to correspond. One must cut his pattern according to his cloth. The sculptor and the surgeon together can make a model to which the surgeon can work with vastly better results than when the operation is undertaken with less exact pre-visualization of the result.

A great number of more or less complete records of our cases were made and in one particular, with the exception of those made by the Italians, they are unique for in a certain percentage they follow the case from the advanced area to its final result in the home hospital, but unless some special effort is made to assemble and correlate these records they will be of little use. This will not be due to lack of interest on the part of the Surgeon General who has been most generous in his appropriation for this work but to a present lack of money, space and personnel available for this purpose. It seems to me that it would not be inappropriate for this section to interest itself in rendering these records available.

Very few new principles in regard to maxillo-facial surgery were developed in this war that do not apply to every other type of surgery, but concentration of thought and the clinical opportunities developed special skill. In saying that there have been evolved very few new principles does not imply that there has been no improvement in the execution of the work. Much of the work now done in special hospitals bears about the same relation to the general run of pre-war plastic surgery as would a modern bungalow to a sod hut. The test of use demonstrated the superiority of some methods and the faults of others in a much more authoritative manner than would have been possible in ordinary civilian practice. The men doing this work attained much greater skill and confidence through opportunities that had never before been utilized. Our experience, among other things, emphasized the following:

The utility of early continuous treatment; not that we were able to carry it out even in the majority of cases, but the contrast between those cases in which it was done and those in which it was not, was very great.

By proper early treatment, I mean first the care of the vital forces of the injured man. The simple procedure of placing a patient, who has an oral or pharyngeal wound, in sitting position, or, if he must lie, turning him on his face, will bring to the hospital many who would die on the way if allowed to remain in the supine position. A half-inch rubber tube passed through the mouth into the oral pharynx will give a perfectly free airway in almost all cases.

The factor which delays and complicates repair is sepsis and added to this, displacement of tissue first by gravity and muscular pull and later by infiltration and scar contraction. In but few cases is the amount of tissue originally destroyed, the dominant factor. The early restoration of the remaining tissues to approximately their normal positions, when done with due regard to surgical principles, combats not only primary and secondary displacements but is the greatest preventative of sepsis.

The most congenial dressing for raw tissue is raw tissue, provided the circulation is good and drainage is established. It is difficult to imagine all periosteum and osteogenitic cells being destroyed in a section of bone unless the covering of soft tissue is also destroyed, therefore, early splinting of the remaining fragments in their proper position with provision against sepsis by proper drainage will give earlier and more perfect restoration than when the tissues are allowed to collapse and sepsis go uncontrolled. The tissues of the face will heal better than almost any other part of the body and are almost immune to the ordinary infections while gas gangrene of the face, except in the orbit, is almost unknown. For these reasons, debridement should not be practiced on the face except for the removal of already devitalized tissue. It is too much to expect even the facial tissue to heal over a mass of comminuted infected bone without providing drainage and some missiles will cause a devitalization of tissue that precludes restoration of circulation, but a certain amount of primary repair can be done in almost all face injuries even if it is only to follow Tuffier's advice of suturing the mucosa to the skin to protect the raw surfaces.

The floor of the mouth, the submaxillary and submental regions are peculiarly liable to an indurating infection and if one of the primary branches of the carotid has been divided, the closer the wound approaches the carotid region the greater the danger. Therefore, except to anchor the tongue, no repair is made in this region but above the lower border of the mandible, all soft tissues should be repaired if the condition of the tissues permit. Especially should the ala of the nose, the angle of the mouth, the ear, the eyelid, and the lip be immediately repaired whenever practical. Flaps of the cheek, lips, chin, alae of the nose, eyelid and ear that have lost part of their attachment rapidly retract and later repair is always more difficult.

Evacuation of the wounded is controlled by military necessity and the type of primary treatment must be modified to meet the conditions. Usually a certain proportion of beds in advanced hospitals were reserved for nontransportables; in the American Army certain maxillo-facial cases were designated as nontransportables. Besides those whose general condition demanded continuous care, all recently sutured wounds, except simple wounds of the cheek and lip, were held when possible until safe healing of the soft tissues had occurred and patients who had the jaws wired together or who could not take fluids were also held.

The removal of foreign bodies at the primary operation is always desirable but in certain cases it is better to insure drainage and delay removal until such a time as special skill and equipment are available and more tranquil surroundings obtainable.

Anesthesia.—When the skill and time are both available, local anesthesia adds to the safety of these cases but in times of stress these conditions do not hold and a skillfully given anesthetic by the mask or intratracheal method will add little to the danger in most cases and has many advantages. No case should be sent to the ward until a free breathing space is assured, hemorrhage controlled and adequate drainage provided.

Secondary hemorrhage is always the result of sepsis. The sepsis as well as the hemorrhage should be treated. When possible, the bleeding vessel should be identified but in indurated tissue it is often better to ligate in the course of the vessel than at the bleeding end. It is an old teaching that secondary hemorrhage from a primary branch of the carotid requires a ligation of the carotid artery and to delay doing this only increases the risk. This, I have always accepted but a recent experience leads me to believe that if the bleeding point is 2 cm. or more from the carotid, isolating the vessel from the indurated tissue, ligating efferent branches and treating sepsis may produce a resisting clot in the stump of the bleeder.

Sepsis about facial wounds is best controlled by drainage, frequently changed packs or external dressings and cleansing mouth washes are helpful but the Carrel-Dakin type of treatment or other germicides are not well tolerated. Acute, spreading infections will rarely occur if proper early treatment has been given; erysipelas is not infrequent in neglected cases. Ordinarily, incisions should not be made for sepsis until pus is demonstrable but indurating infections of the floor of the mouth and submaxillary regions (Ludwig's Angina) that are spreading or that embarrass respirations demand free incision. All incisions for sepsis about the floor of the mouth should be made from the skin surface.

Loss of segments of bone and delayed union are due to the original injury, of course, but sepsis is the determining factor in almost all cases and is always fostered by the presence of a foreign body which is usually a fragment of dead bone or the exposed root of a devitalized tooth. Neither x-ray nor instrumental examination may absolutely indicate the offending tooth but it is often remarkable how quickly union will occur when the offender is removed even though the non-union was about the only evidence of the sepsis. In the presence of infection, especially of a chronic character, the bone-forming effort is perverted into the production of fibrous tissue but on eliminating the sepsis, the bone-formation power reasserts itself.

A fistula is a drainage outlet and cannot be expected to heal unless the cause of the discharge is eliminated or another outlet is provided. Further, if the mucosa has become attached directly to the skin or by dense scar tissue, or if the walls of the fistula are actively diseased, the fistula will persist but with these conditions corrected all fistulae tend to heal spontaneously. Radical operations were rarely necessary; simply confining the jaws and applying a little pressure controlled all but a very few of the salivary fistulae we encountered.

There was little radically new in the splinting of the jaws brought out during the war. Our Allies showed us that the cast metal splint is more easily made and more satisfactory than the swedged metal or vulcanite splint with which we were more familiar. Many individual types were produced but on the whole the simpler the splint the better, and most of them conformed to or were modifications of such old types as the cap splint of Houlihan, the open-bite splint of Gunning, the intradental splint and the interlocking planes of Gilmer. The control of the ramus or its fragments brought out special devices.

Reconstruction.—Reconstruction is too broad a subject to more than touch upon in this address but there are a few broad principles that were forcefully brought out in our recent experiences. The most potent factor for delay of recovery and depressing morale was the necessity of continuous evacuation and the incident delay and interruptions of treatment which, though unavoidable under existing conditions, could be greatly ameliorated with proper provision. Provision should be made to transport these cases as early as possible to a permanent, properly equipped base and they should be retained there until the treatment has progressed to the point where interruption and rest are in order.

These bases should be provided with ample personnel of surgeons, dental surgeons, sculptors, artists, recorders and all necessary equipment. Much of the delay in the recovery of our cases has been due to insufficient personnel in our reconstruction hospitals, patients awaiting months after they are ready for operation. In each case there should be at least one with the utmost skill in plastic work and one dental surgeon of the same caliber. These two planning the work in each case could under their supervision turn the operating over to technically skilled assistants and produce expedition without compromising results. These hospitals should be agreeably situated where the maximum outdoor recreation is possible, preferably not near a large city.

No part of facial reconstruction received a greater impetus during the war than bone grafting of the lower jaw and experience has shown that if any of the simpler methods, whether a free bone graft, an osteoperiosteal graft, or a pedicle graft, is done in a clean field any one of these is apt to be more successful here than in almost any other part of the body but complicated unsurgical methods will almost always be disappointing.

Grafted bone must be subjected to the strain of function or it will become absorbed. A few strips of periosteum and osteogenetic cells spanning a defect in the lower jaw, if in contact with the bone at each end, will reproduce the missing section but a piece of solid bone with periosteum and endosteum placed loose in the tissues, as for instance to form the bridge of the nose, will be rapidly absorbed. Where pure bulk is required, as the bridge of the nose or the prominence of the malar bone, cartilage with as much perichondrial covering as possible is the best material and is, I believe, permanent.

The time required before bone grafting may be undertaken will depend largely upon the amount of sepsis that has been allowed to develop and here, as everywhere, the character of the early treatment will have much to do not only with the delay required but also as to whether a bone graft will be necessary.

An essential part of almost every plastic operation is the complete removal of all scar tissue and, after this has been done, no matter how insignificant the defect previously appeared to be, it will be the same size as the original wound but the distortion of the neighboring tissues will have been released and a much better restoration can be made. The true size of the defect and the distortion of the neighboring tissues must be thoroughly grasped before the correction is undertaken but in the cases of surface burns, where the loss is very great, smooth scars may be retained, relaxing them when necessary by the insertion of flaps or skin grafts.

Plastic Surgery in its highest form is an exact art and he who would succeed must work along the lines of exactitude. Granting that one has control of the case, the number of operations required to restore a given case will depend not so much on the extent and character of the defect as upon the foresight of the operator. It is not reasonable to expect that a large plastic repair can be made without the necessity of subsequent adjustments and, in many cases, a number of consecutive steps are necessary to attain the end but these steps should be a part of a preconceived, exactly executed plan and in no sense haphazard. With the aid of the sculptor and the artist, after a thorough study of the conditions in the case, the whole plan should be worked out, recorded and patterns made as far as possible. In complicated cases these will have to be modified, the extent depending largely upon the skill and experience of the operator, but in any case this plan will be productive of better results with fewer number of operations than any "hand to mouth" procedure in which the whole plan has not been previously worked out with exactitude.

To produce the best results, often very large or long pedicle flaps have to be turned and the loss of one of these flaps through insufficient blood supply is a real disaster. Though the method is not always free from complications, the delayed placing of such flaps has an element of safety that is often very advantageous. When a large flap is to be used, it can be raised from its bed, all bleeding controlled, and immediately sutured back in its original position taking care that no blood collects under the flap. After a few days, when the blood supply is well established, it can be switched to its new position with little danger to its vitality. In appropriate places the tubing of the pedicle after the plan of Gillies is very useful.

When the wall of an epithelial-lined cavity is to be restored, the lining as well as the outer surface must be provided. I believe that, previous to the war, this plan had not been put in practice with regard to the nose and that is the reason why naso-plastics had given such poor results. A nose that looked fairly satisfactory immediately after operation subsequently contracted in its raw surface until it more nearly resembled a daub of dough and was good for neither show nor blow.

Speaking of the lining of cavities, the whole subject of skin grafting over a form, though it had been done previously, owes its greatest development to the war. My experience with it has been that the Esser inlay in the mouth or the grafting over a form in the mouth, the Gillies' outlay for ectropion of the lid and the Esser inlay for the conjunctival sac are very useful procedures. In my own hands the lining of the new nose with a Thiersch graft, whether applied on a form or to the under surface of the flap before transplanting it, is absolutely unsatisfactory on account of subsequent contraction and I can hardly imagine myself ever again resorting to it. Hair-bearing skin may be depilated by the X-ray before being used to line a cavity but this requires particular skill on the part of the roentgenologist and is not always permanently successful. Without previous depilation, the hair will continue to grow at least for years. In other respects, skin transplanted into the mouth rather quickly assumes many of the characteristics of mucous membrane and after a time can with difficulty be distinguished from the latter.

Usually a man will stand a second operation better than the first, all his fighting forces are on their guard but hemorrhage is more free as reoperation continues. It was a noticeable fact that soldiers in condition bleed very little in evacuation hospitals but at subsequent operations bleeding becomes a serious factor. In late cases when large scars have to be excised, bleeding may become a serious menace to life in spite of preliminary ligations and all other precautions. This must be reckoned with in planning certain operations. In the early stages after injury reoperation is well borne and delayed suture is often a useful procedure. Later, both the general condition and the reaction of the tissues demand considerable periods of rest between operations and this brings up a sociologic as well as a surgical factor.

Rehabilitation will be difficult for many of these men, more on account of the mental and moral effect of their hospital experiences than on account of the physical results of their wounds. The delay in the hospital and the especial attention which these men receive, both from the organized social workers and individuals, is in the long run subversant to both morale and discipline. Most of these cases demand relatively short periods of hospital treatment compared with long periods for recuperation, and these recuperation periods could be better used in rehabilitating the man to his home life than living in hospitals. In handling these cases, I believe that they should be so situated that as early as possible they may take up their normal civilian occupation. This besides other considerations, will have the distinct surgical advantage of allowing longer intervals between the constructive operations and the final adjustments without delaying the return to civilian life.

In giving you this review, I have but touched the broader phases of the subjects involved. Many of them are to be presented more specially by those who are to follow.

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REPORT OF THE DEPARTMENT OF HEALTH AND SANITATION OF THE UNITED STATES SHIPPING BOARD FOR THE PERIOD NOVEMBER 16, 1917, TO NOVEMBER 15, 1918

By Lieutenant Colonel PHILIP SCHUYLER DOANE
Medical Corps, United States Army

Introduction.—The strenuous rush to build ships with which to help to win the war created an emergency in the matter of guarding the physical well-being of shipworkers. The sudden concentration of men into communities which lacked sufficient housing accommodations led to overcrowding and produced insanitary surroundings. Not only was the effectiveness of the work endangered by conditions which threatened the physical vigor of the men but a situation existed which might at any time lead to a serious epidemic which would be disastrous to the civil population as well as to the shipbuilders themselves. This general situation presented a formidable task for the handling of which the Department of Health and Sanitation of the Shipping Board was organized.

It should be noted that the Shipping Board was the governmental agency through which the extensive problems of ship control were handled and by which the war powers of the President in the whole field of water transportation were administered. The Board was created in peace times (September, 1916) but during the war its powers were enormously enlarged. It regulated all the shipping of the country; chartered, purchased and requisitioned the vessels of Americans, enemies and neutrals; repaired the seized German ships; recruited and trained the officers and seamen of merchant vessels; supervised the chartering of all ships from American ports; regulated imports; developed port facilities; handled large problems of labor control and operated a vast merchant marine.

The comprehensive program of ship construction, involving the expenditure of over $3,000,000,000 and the employment of over 300,000 men throughout the country, has been carried on through the "United States Shipping Board Emergency Fleet Corporation," which is under the control of the Shipping Board, of which indeed it is a part. As the agent of the President in the exercise of the far reaching powers conferred by war legislation, the Emergency Fleet Corporation rapidly developed a huge organization, with many divisions, sections and

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[1] Director, Department of Health and Sanitation United States Shipping Board Emergency Fleet Corporation, Philadelphia.

branches, including an elaborate field organization acting under instructions from the home office and maintaining close relations with the management of all the shipyards. It took over all the yards of the country which were suitable for its purpose; commandeered all ships, American and foreign, in course of construction; greatly extended the existing yards; planned and built new yards; inaugurated the "fabricating" plan of standardized ship construction on a huge scale, and launched a program which would have resulted in 1919 in the delivery of not less than half a million deadweight tons of ships monthly. From a backward marine power the United States suddenly attained a shipbuilding capacity superior to that of any other nation in the world.

Organization and Functions of the Department of Health and Sanitation.—When the far reaching construction program was well under way, Chairman Hurley of the Shipping Board, realizing the need of a special department to protect the health of the shipworkers, requested the Secretary of War to supply an officer for that purpose. The request was referred to General Gorgas who detailed Major Philip Schuyler Doane (formerly a Chicago physician) for duty with the Shipping Board. Major (later Lieutenant Colonel) Doane reported for duty November 16, 1917, and was assigned to service with the Emergency Fleet Corporation as the Director of the Department of Health and Sanitation.

The functions of the Department of Health and Sanitation of the Shipping Board as finally worked out were to recommend and put into effect such measures as might be necessary to create and maintain sanitary conditions for the shipworkers in the yards and in their living and eating places as well; to establish and conduct dispensaries and hospitals and to carry on a general program of medical and sanitary supervision covering the whole country so far as shipyards were involved. At first certain phases of the care of seamen in the merchant marine were undertaken but in view of the jurisdiction of the United States Public Health Service in this field, these activities were dropped and the efforts of the department were confined to such measures as affected the Emergency Fleet Corporation in its construction program. It was at no time the intention of the Shipping Board to duplicate any existing branch of the Federal or State government and the fullest cooperation with the Public Health Service was sought. It was evident, however, that this service because of financial and other limitations was at this time inadequately equipped to care for the emergency problems of hundreds of thousands of shipyard workers.

A preliminary survey of the shipyards revealed conditions which amply justified the creation of this special Department of Health and

Sanitation. Sanitary work had never before been promoted on a comprehensive scale so far as the shipyards were concerned and the newness of the problem called for a great deal of organizing skill. Some few yards had dust-covered first aid cabinets and made some pretenses to provision for health and sanitation but quite a number of them had no medical attendants whatever and they were so absorbed in the feverish attempt to rush their ships to completion that sanitary and medical matters were either entirely disregarded or relegated to a subordinate place. The sympathetic cooperation of most of the yard officials had to be enlisted and it was necessary to convince them of the necessity of the work, whereas formerly very little significance was attached to the need for sanitary precautions. There was a feeling that shipbuilding was an outdoor pursuit in which the nature of the work kept the men tough and healthy and that sanitary conditions would take care of themselves. Where the yards had dispensaries their efficiency was very low and the physicians and nurses that were occasionally found were often incompetent and inadequate.

Not only were many absolutely new yards being built but the old yards were being reconstructed and greatly expanded which meant that in every yard supervision was necessary in the matter of water supply, housing, drainage, sewage disposal and general sanitary environment.

Men of all types and nationalities often unused to the conditions of work and climate in which they were placed were suddenly marshaled in the army of shipbuilders and this taxed the energies of the department in its efforts to prevent the spread of contagion, to inculcate habits of cleanliness and to protect men from the strain which comes from exposure to unaccustomed conditions of work. To get results quickly involved a cutting of red tape, a rapid organization of an administrative force, a pledging of financial support and a vigorous prosecution of many local campaigns of sanitation. It was a problem of business administration no less than of sanitary engineering and medical and surgical supervision.

One of the important preliminary problems was the building up of an efficient personnel in the department. It was first of all necessary to secure the services of energetic and competent sanitary engineers together with medical men familiar with surgical technique. The Act creating the Shipping Board (Section 4) provides for "the detail of officers of the military, naval or other service of the United States for such duties as the board may deem necessary in connection with its business," but owing to the urgent need of retaining all the personnel of the Army the Surgeon General requested that the Shipping Board should employ doctors and sanitary experts from civil life. This was hard to do in view of the fact that most of the doctors were being drawn into the military or naval establishment and it was necessary at the time of the serious epidemic of influenza for the director of the department to request that the granting of commissions to medical men on the Pacific Coast be held up for two weeks so that doctors could be obtained for the care of the influenza cases. This request was generously complied with. Under all the circumstances it will be readily seen that competent sanitary engineers were scarce, but the department was fortunate in obtaining the services of some of the very best in the country. Two competent sanitary engineers and two medical men with the necessary clerical assistants were placed in the home office to assist the director, and a field force of sanitary engineers, sanitarians, physicians and nurses was stationed throughout the country, all reporting to the home office for instruction and general policy. The sanitary engineers were all men of high standing, who had been earning at least twice as much income in peace-time pursuits and whose efficient service was offered as a patriotic duty. The following is a statement of the personnel of the department at the time of its full development:

Lieut. Col. Philip Schuyler Doane, M. C., Director,
Mr. W. L. Stevenson, Sanitary Engineer, Asst. Director.

Medical Officers
Dr. C. Sheble Brown
Dr. Wm. Hall Coon
Dr. Jacob Geiger
Dr. E. R. Sando
Dr. J. P. Sprague

Sanitary Engineers
Mr. Don W. Bingham
Mr. Samuel A. Greeley
Mr. George T. Hammond
Mr. W. F. Langelier
Mr. J. L. Ludlow
Mr. George H. Shaw
Mr. Chas. D. Weirbach
Mr. C. E. Turner

Sanitarians
Mr. Chester S. Kingsley
Mr. D. G. Luckett

Surveys, Reports and Methods of Procedure.—The first few months were spent in examining the yards, surveying the whole situation, conferring with various commissions and governmental agencies and mapping out a general program. Full investigations were made by the director and the sanitary engineers in the field, and by May, 1918, sanitary and health surveys had been completed in all the shipyards connected with the Emergency Fleet Corporation.

For the guidance of the yards a book of standards was drawn up embodying the principles of the Department of Health and Sanitation. For this purpose a great deal of study and thought was devoted to the specialized phases of sanitation which apply to shipyards, the whole force of sanitary engineers being called in conference, and every sentence thoroughly threshed out. In this book full specifications were given regarding the medical care of workers, the treatment of wounds, the suppression of contagious diseases, the construction and outfitting of first aid stations, hospitals, and dispensaries, the extermination of mosquitoes and flies, purity of food and water supply and the maintenance of healthful housing conditions.

These standards were issued to every yard and were used as the basis of the general program promoted by the department. Each inspector followed a uniform and complete schedule of topics in making his regular reports and as these inspections were made each month the Philadelphia office was enabled to keep complete records of the conditions in every district. These reports present an illuminating record of all the significant features bearing upon the physical welfare of the shipworkers in the country and also of the communities adjacent to the yards.

Except in the fabricating yards at Hog Island, Bristol and Newark where the shipbuilding corporation and the Government stood in the relation of principal and agent, the department had no direct authority to enforce its standards. Difficulty of legal control was further increased by the fact that in some cases the yards were only partly engaged in work for the Emergency Fleet Corporation and were working in large part under naval contracts, the proportion for the Navy being as high as 70 per cent in some cases. The matter of compelling the observance of sanitary standards by means of clauses inserted in contracts between the Emergency Fleet Corporation and the yards was taken up with the legal division of the corporation, but for the most part this contractual authority was lacking.

In the absence of absolute authority, however, a very powerful force of moral suasion sufficed for the purpose. When the visit of an inspector revealed conditions calling for improvement, the department prepared recommendations and these were presented through the district managers of the Fleet Corporation to the yard officials as urgent requests for action. The officials received these recommendations in the most friendly spirit and with surprisingly few exceptions they were promptly acted upon. In the few cases where compliance with its recommendations was refused, the department called the attention of the yard officials to the fact that conditions were being reported to the general manager, and that this fact would have weight in the granting of future contracts. Tabulated statements regarding sanitation in the various yards were sent into the Shipyard Plants Division, and these were referred to in the preparation of efficiency records.

The generous policy of the Shipping Board in approving sanitary projects, in supplying funds and in coöperating to forward the work of the department was most helpful. The whole board backed up the department at every turn, and this splendid coöperation supplied the impetus which enabled the work to be vigorously pushed.

The department had to rely constantly upon the coöperation of local, municipal, state and governmental authorities and large business organizations and its uniform policy was to maintain the closest contact with the health officials of counties, towns, cities and states and to act through them wherever possible. At a meeting of public health officials from all states which was convened in Washington in June, 1918, opportunity was taken to confer with those state officials who controlled districts in which yards were located and in this meeting a spirit of active interest and readiness to assist was manifested by all. State laboratories were opened to the department for bacteriological examinations, vaccines were supplied by public health offices, municipal improvements were installed upon the urging of the department, numerous ordinances were carried to guard the food supply, suppress epidemics and enforce the observance of sanitary principles; new health offices were created, assistance was afforded in mosquito extermination and many other helpful measures were taken to coöperate with the department. It was from these public agencies that the department derived the authority which was needed for the successful prosecution of its work.

Examination of Workers and General Medical Treatment.—In the matter of general medical care every shipyard employe was brought within the scope of Health and Sanitation Department's activities. Upon seeking employment each laborer was given a general examination, was reëxamined from time to time and was promptly and thoroughly attended to when sick or even when suffering from a minor ailment.

The physical examination was insisted upon throughout the yards not only to protect the employer's interest by elimination of unfit men but primarily as a protection to the men themselves, inasmuch as such examination prevents a diseased workman from spreading contagion to his fellows and makes possible a preventive treatment of unhealthy conditions which without the examination would have been undetected until serious trouble had developed. Failure to make a perfect showing in the examination did not necessarily involve exclusion from employment, but the examination would guide the management in assigning the employe to the work for which he was best suited. Of course the employer's interest in having the men examined was obvious, for if certain hidden defects were detected in advance the company could not be made liable for them. A ruptured man, if his condition were unknown to his employer, might on lifting a heavy weight suddenly clap his hand to his side and pretend to be suddenly overcome with pain, seeking later to hold his employer liable on the ground that he suffered the rupture while at work in the yard. Examination in advance would, of course, prevent such fraudulent claims.

Occupational hazards and diseases are rather serious in the strenuous field of shipyard employment and this necessitates examination in order to avoid putting heavy burdens on weak shoulders and also to prevent defects of workmanship which might conceivably result in the loss of thousands of lives. For these reasons regular examinations were conducted in specially arranged quarters, the specifications for which, together with the printed form to be made out by the examiners, were supplied from the Philadelphia office. Particular attention in these examinations was given to the exclusion of those infected with typhoid, malaria or venereal diseases. The American Federation of Labor recognizing that the vital interest of the workmen was involved, approved the plan of having workers in the shipyards examined. In granting this unusual concession the Federation was influenced by an appeal on the part of a representative of the department.

In the great majority of the yards resident physicians were stationed, giving their full time to this work, and in other cases physicians were engaged to make regular visits. Practically every yard had its dispensary and where the number of employes justified it, yard hospitals were established. The employes were required to report even their minor ailments and in this way many working hours were saved to the management.

In Philadelphia where 5,000 men and women were employed in crowded conditions a corps of physicians and trained nurses was retained and the corporation maintained a free dispensary, medical service and rest rooms for the employes under the jurisdiction of the Department of Health and Sanitation. These employes were in many cases "war workers" with no permanent residence in Philadelphia, without personal connections, not knowing where to go for assistance or whom to employ in case of illness, and it was the business of the department to see that they were given early treatment in their homes or places of lodging. Special attention was given to the women workers employed by the corporation in large numbers.

It was anticipated that a great deal of trouble would develop because of heat prostration. Work in a steel hull on a hot day is particularly trying and dangerous and the seriousness of the problem was increased by concentration of the great shipyards along the Middle Atlantic and New England regions where the summers are severely hot. Directions were sent out to all the yards early in June to prepare for this danger by establishing stations to render first aid to heat prostration cases. The men were advised to carry cooled water with them and arrangements were made for tents or small huts at convenient intervals, each tent to be equipped with a tub, ice box, medicines and other necessary facilities. Suggestions for avoiding heat prostration were prepared by the department and issued to the personnel of the corporation. The employes were advised to wear loose, light clothes and comfortable shoes; to avoid undue exertion and overeating, especially of greasy food, restricting the diet so far as possible to fruit, milk and vegetables; to avoid ice water; to bathe frequently, and finally to "Keep Smiling." Most of the prostrations which occurred took place in the great shipyards along the Delaware River and at Boston and other New England points, there being but few cases in the southern and Great Lakes yards and practically none on the Pacific. Undoubtedly many lives were saved by the precautions taken.

Surgical Service.—For the treatment of injuries the services of competent surgical staffs were made available in the yards; first aid stations were maintained in accordance with specifications issued by the department; yard dispensaries and hospitals were established, or if this was not possible, definite arrangements were made with private and municipal hospitals, and adequate facilities in the way of stretchers, ambulances, etc., were provided.

The department issued specifications to the yards as to the construction, equipment and facilities of the dispensaries and hospitals. A dispensary was equipped with a dressing room, waiting room, X-ray section and operating room, and could be used for emergency operating, though surgical cases were as a rule sent to the hospital. At the time of a serious fire at the Submarine Boat Corporation, the men of the fire-fighting force who were overcome were brought into the dispensary and revived.

Shipbuilding is one of the most hazardous of occupations, for the men work at great heights on structures which are not always safe; heavy pieces of metal are handled; the workers below the scaffolds are subjected to danger from falling materials; hot bolts fly through the air, and formidable machines are used. The number of injuries reported to the department was very large, but this was due in part to the fact that the men were told to report even the least scratch for immediate treatment, so as to avoid infection and save time for both the worker and his employer. It was found that a need existed for more active, preventive measures. The department was to a certain extent hampered by the lack of authority to establish "safety first" measures, and to eradicate the causes of injuries. As it was, however, an educational campaign was carried on among the men, advising them of the need for certain vital precautions and the importance of caring for every wound.

Special effort was directed toward enlisting the support of insurance companies in the prevention and proper treatment of injuries. It was found in some instances that the companies tolerated the employment of cheap and incompetent doctors and surgeons. This situation calls for improvement all over the country. The insurance companies should be awakened to the poor business policy of tolerating conditions which lead to a needless industrial and human waste, and which in the long run cause financial loss to the insurance companies themselves. The experience of the Department of Health and Sanitation along this line was very gratifying, however, and it was found that the insurance companies yielded to the department's requests in putting in just the equipment asked for.

Measures Against Communicable Diseases.—Very active measures were taken under the supervision of the department to prevent the spread of communicable diseases. Vaccination against smallpox was made compulsory in the yards and optional vaccination for typhoid was instituted. At Hog Island, where men of all nationalities were crowded together, including Mexicans and negroes from malarial districts, it was feared that the malarial mosquito would rapidly spread the infection throughout the yard. Every one of these foreigners was subjected to a full examination and malaria cases were kept out. The men were stripped in the examining rooms and their clothing was disinfected, washed and dried by a rapid-drying process while the examination was being conducted. As a result of these and similar precautions Hog Island was fortunately saved from a malaria epidemic.

In the matter of typhoid, the peculiar conditions affecting the shipyards caused grave concern as to the possibility of epidemics. The lowness and poor drainage of the yards, their proximity to sewer outlets, the marshy or swampy character of the surrounding country, and the fact that most of them bordered upon streams into which the sewage from adjacent cities was drained tended to produce the sort of conditions out of which typhoid develops. Most of the men took the antityphoid inoculation, and the most careful attention was given to water and food supply, proper toilets and sewage disposal and to the elimination of mosquitoes, flies, rats and vermin. At the Baltimore Dry Dock & Shipbuilding Company it was found that many of the men coming to the yards were typhoid carriers, and that their excreta polluted the water in the ways. The department endeavored to exclude typhoid carriers, and took pains to protect the rest of the men from all infected excreta. In many cases springs, wells or mountain streams were condemned, and the constant water examinations which were conducted by the states proved of the greatest value in this respect. As a result of specific measures and also of the whole broad program of sanitation and mosquito extermination (which is presented in a later section of this report) the department succeeded in avoiding serious typhoid epidemics.

The Campaign Against Venereal Diseases.—One of the matters which received particularly active attention by the department was the control of venereal disease. Infected men were present in considerable numbers in the yards; women flocked to the shipyards for immoral purposes; insufficient methods of precaution against the transmission of these diseases were being taken and local authorities were in many cases lax in the suppression of vice. The control of this formidable danger to the shipyard workers received constant attention by the department. A campaign of education was carried on in the yards, and a good deal of literature was sent out which pointed out the risks involved, emphasized the necessity for early treatment, and called attention to the danger of going to advertising quacks. One of the most effective of the educational methods was the presentation of the film "Fit to Fight," a moving picture play prepared under the direction of the Medical Department of the Army, which depicted in telling fashion the serious consequences of sexual immorality. This film, which had gone the rounds of the Army cantonments, was shown in many of the shipyards. Isolation wards were established in city hospitals to care for the females who were spreading disease, and the men were treated in clinics.

At Bath, Maine, the conditions in this respect were particularly bad. This old town was without a health board, was a dumping ground for the bad food of nearby states and its general sanitary conditions were very poor. Houses of ill-fame were abundant and venereal disease was rampant. The two shipyards at Bath, the Texas Shipbuilding Company and the Kelley-Spear Company, were under great danger because of this condition, and it was imperative that a vigorous cleaning up campaign should be started. The city of Bath being without funds to carry on its health work, an arrangement was made by which a health officer was appointed by the Health and Sanitation Department and his services paid for by the Emergency Fleet Corporation, while the municipality of Bath empowered him with full authority to act as its health officer.

A college man with full training as a sanitary engineer was selected for this work and he took hold at once in vigorous fashion with the aim of enforcing the municipal statutes and cleaning up the entire city.

At first he attempted to remove the venereal menace by having the inmates of one house arrested, brought into court and removed as a public nuisance. He had made tests and discovered that every one of the women of this resort was diseased, but inasmuch as he had neglected to have the tests made by a certified physician his case before the judge was defeated by clever opposing counsel. Nothing daunted by this temporary setback to its plans, the department started in the local papers a campaign of publicity which widely advertised the diseased condition of these women and emphasized the menace of their presence in the city. This had the effect of rapidly closing the resorts and every one of the inmates moved to another city. It is realized, of course, that such methods, which merely transfer the evil from one place to another, do not work a permanent remedy, and the experience of the department was that the most effective methods of suppression were the exclusion of diseased women from the yards and the isolation of any who were found contaminated with the disease.

Spanish Influenza.—From September to November, 1918, the alarming epidemic of Spanish influenza seriously taxed the energies of the department. The regions most affected were Quincy, Mass., and the Delaware River district. To handle the Delaware River situation, an arrangement was made for the use of a large quarantine station for immigrants at Marcus Hook. This station contained accommodations for 3,000 patients and the cases from Chester and Bristol, together with the overflow from Hog Island, were taken here for treatment, an arrangement being made by which the Marcus Hook management furnished the buildings, beds and bedding, while the Health Department of the corporation furnished the food and coal. These accommodations did not prove to be sufficient for the emergency in this region, but they were of material assistance.

The congestion resulting from the phenomenal growth of Chester, Pa.—a city which had rapidly grown from a population of 38,000 in 1917 to 125,000 in 1918—caused this to be the most severely stricken city in the country at the time of the influenza epidemic. Conditions at Chester were extremely bad. In spite of the fact that the Department of Health and Sanitation had no real authority in the premises, the director went before the town council at the very outset of the trouble before the epidemic had secured any great headway in the city, and outlined a definite program of preventive measures. He showed the seriousness of the situation if existing conditions were allowed to continue, and demanded that the saloons, theaters, and other places where crowds congregated, should be closed at once. This idea was at first received in a most unreceptive mood, but the council was thoroughly frightened and in an executive session which was held immediately after the presentation of this appeal, a vote was taken putting into effect all of the measures recommended. In this way Chester closed three days sooner than any other city in the state.

Partly through the help of the housing division of the corporation, the Health and Sanitation Department was able to assist the city of Chester to establish hospitals at the First Regiment Armory, and at Masonic Hall. Six ambulances were secured from the firm of Strawbridge & Clothier Company in Philadelphia, and the local Red Cross organization supplied three ambulances, and also gave the services of a number of devoted young women who worked day and night to relieve the fearful conditions in this stricken city.

The epidemic threatened serious results also to the employees of the Emergency Fleet Corporation in Philadelphia. The local hospitals were filled to overflowing with cases from the civilian population of Philadelphia, so that employes of the Emergency Fleet Corporation were unable to get into the hospitals, or to secure physicians to look after their needs. The difficulty was increased by the fact that the department staff was inadequate and every member of it was fully occupied with the situation in the shipyards themselves. The Emergency Fleet Corporation management under these circumstances, consented to the opening of a special hospital and for this purpose the department succeeded in obtaining the use of a residence of 30 rooms, which, within the short space of 24 hours, was completely fitted up as an efficient hospital with trained nurses, house staff and physicians from the Jefferson Medical College. This hospital did very effective work in looking after the corporations' employes, the nurses in particular working very hard and as a result not a single Emergency Fleet Corporation case was lost.

The influenza vaccine was used over a wide area, but was found to be of no value. The employes, however, were fully instructed as to the seriousness of the situation and as to the proper measures to take. It was required that all cases of persons complaining of general depression, headaches, backache, irritation of the eyes, running nose, sneezing, coughing, or other like symptoms, must be reported to the doctor at the corporation's dispensary. It was further advised that employes avoid crowds, especially in poorly ventilated theaters, movies, etc., avoid contact with any one afflicted with influenza, as for instance, in the use of towels, and that they regularly practice certain simple precautionary measures, such as the use of a nasal spray and gargle and in particular the covering of the nose and mouth while sneezing or coughing. Unusual preventive measures were taken in all of the offices at 140 North Broad Street. The telephone mouth pieces were treated with a disinfectant daily, the cuspidors were sprayed and careful atten tion was given to adequate ventilation. As a result, there was less influenza in this company than in any other big corporation.

Throughout the yards the men were surrounded with careful safeguards, and early treatment was given not only to the shipyard workers, but also to their families—a service which was unusual among large industrial concerns. In general it may be said of the situation throughout the country that the number of serious cases and of deaths was very low.

Water Supply.—The adequacy and purity of the water supply in the yards was given the most careful attention. In the specifications issued to the yards the department insisted that surface water from streams and lakes should never be used without purification; that whereever possible the yards should avail themselves of a water supply of established purity in a nearby city; that shallow wells should be used only when absolutely free from soil or surface contamination; that walls of the well should extend above the surface with a provision for drainage that would carry surface water away from the well, and that bacteriological and chemical analyses be made of the water at regular intervals by reputable laboratories, copies being sent to the Emergency Fleet Corporation.

Experience reveals that thirsty men, in spite of warning notices will drink "any water that is wet," and for this reason it was specified that all the water on tap even for washing purposes should be of drinking-water quality. In order to deliver water to the highest parts of the yard and buildings elevated tanks with amply large piping were required.

Not only the source but also the distribution of the water called for close watching. In place of the insanitary method of distribution by bucket with common drinking cup, the water was piped and bubbling fountains with inclined jets and housing to prevent the drinker's lips from touching the outlet pipe were installed. In places where fountains could not be installed covered barrels equipped with spigots and provided with dispensers for individual drinking cups were used.

At the Alexandria yard, where many men were found suffering from dysentery, it was found that negro water carriers were saving themselves steps by taking the water from the Potomac River which was polluted with Washington sewage. Constant watchfulness was necessary to prevent such conditions.

One of the difficulties frequently encountered was the interconnection between the water mains carrying drinking water and those conveying impure water for industrial use and for fire prevention. Where such inter-connection was absolutely necessary and was accepted by the Department of Health and Sanitation and the local health authorities, an improved type of connection, consisting of two check valves, three pressure gauges and two blow-offs was specified and monthly examinations were made to test the tightness of these check valves.

A continuous epidemic of typhoid at Wyandotte, Michigan, revealed the fact that its water supply was being derived without sufficient purification from the Detroit River, which was polluted with sewage from the city of Detroit. When it was reported that a thousand men were taken sick at Wyandotte, all suffering from acute dysentery, a sanitary officer was immediately sent from the Philadelphia office to investigate and determine the cause of this epidemic. He at once traced the source of this outbreak to the impure water. A temporary arrangement for boiling the water was rigged up, and a campaign in the town was launched looking to the establishment of an adequate filtration plant. After strenuous agitation the vote in favor of issuing municipal bonds was carried, the approval of the Capital Issues Committee at Washington was secured and the construction of the filtration plant begun.

Mosquito Extermination.—The war against the disease-carrying mosquito involved extraordinary methods and drastic measures in the field of sanitary engineering. The most comprehensive undertaking was that at Hog Island, Pennsylvania, near Philadelphia, where a low, swampy, mosquito infested district, practically uninhabited, was selected as the site for the largest shipyard in the world. The eradication of the mosquito from this region was as important to the shipbuilding program as the drastic sanitary measures on the Isthmus of Panama were to the construction of the interoceanic canal. As early as January, 1918, the director of the Department of Health and Sanitation called a meeting of the various interests involved to discuss the feasibility of abolishing the mosquito. Meetings were repeated from time to time, and at the final meeting in April the following organizations were represented:

Philadelphia & Reading Railroad.
Eaton & Brown Company.
The U. S. Navy Yard (League Island).
Health, Highway and Engineering Departments of the City of Philadelphia.
Westinghouse Electric and Manufacturing Company.
New Jersey State Board of Health.
Pennsylvania Rifle Range.
American International Shipbuilding Corporation.

United States Shipping Board.
Pennsylvania State Board of Health.
Pennsylvania State Legal Department.

A project was planned, the sum of $270,000 was contributed by the various organizations and work was begun. By a process of ditching, oiling and draining the mosquitoes were eliminated and over ten thousand acres of land, formerly swamp, were reclaimed and made available for truck gardening. Fifty-five thousand gallons of oils were used; draining pumps of a capacity of 180,000,000 gallons per day were employed; 120 miles of ditches and channels were constructed and vegetation was mowed over an area of 1,750,000 square feet to expose the surface of the water for inspection and oiling. There were no mosquitoes in south Philadelphia in the summer of 1918 (much to the surprise of the inhabitants) and the mosquito was not a nuisance at Hog Island. In this instance the supervision of this vast work was carried on by the Department of Health of the Commonwealth of Pennsylvania to whom great praise should be given.

A similar campaign was started in the region around the property of the Submarine Boat Corporation, another great fabricated shipyard at Newark, N. J. This work was conducted under the direction of the Mosquito Commission of New Jersey, and projects of a like nature were promoted at Camden and Gloucester in the Delaware river district; at Los Angeles, and at various points on the southern coast, such as Orange, Houston, Rockport, Slidell and Wilmington, N. C. Sums amounting to more than $800,000.00 were involved in these projects for mosquito extermination and drainage between January and November, 1918, such sums being contributed by local health boards or civic and industrial organizations. The Shipping Board gave none of this with the exception of $50,000 contributed at Hog Island through the American International Shipbuilding Corporation.

A formidable war was also waged against the fly menace. In general, great pains were taken to have all animal and human excreta kept covered or screened, in order to destroy the fly and its larva and to prevent any transport of disease germs. At Hog Island a pest of flies developed in the early summer and on investigation the cause of this pest was traced to piggeries within half a mile of the Hog Island yard. A low class of foreigners had established a community of miserable shanties in this out-of-the-way region and were raising hogs on garbage which was hauled from the city in carts and wagons. How to get rid of them was the problem.

An appeal was made to the State Commissioner of Health who proceeded to institute court action. It was found that this method of procedure was too slow for the emergency and another urgent appeal on the part of the director of the department resulted in a "cleaning up" of the premises. State police were called in and the "piggeries" were driven out. In this case it was felt that the interests of thousands of shipyard workers were clearly paramount to the questionable right to maintain a nuisance and that the slight possibility of suits against the state could well be disregarded. The fly nuisance was thus abolished and no legal complications have since arisen.

Another situation which required vigorous measures was a refuse heap near Newark, N. J. which was infested with millions of rats which proved a serious nuisance to the Submarine Boat Corporation and also to a large Ordinance Supply Depot located close by. The services of an expert in rat extermination from the Agricultural Department were obtained; the rats were poisoned, the pile burned and dug over, and an order issued by the mayor of Newark discontinuing the use of the spot as a dumping ground, the refuse thereafter being disposed of by incineration.

Toilets and Washrooms.—The department made every effort to secure sanitary toilet arrangements. The ordinary unscreened privies and "drop toilets" (consisting simply of seats over the water at the end of the ways) were found in common use, but these were eliminated. Where outdoor privies were permitted, as in some parts of the South, the type of construction was specified and the inspector took care to see that they were kept in sanitary condition so as to prevent water pollution and to keep out flies. Adequate construction, ample ventilation, lighting and screening, frequent cleaning and disinfecting and precautions against the transmission of disease were required in connection with all toilet facilities. As to methods of sewage disposal, the Department of Health and Sanitation stood ready to advise appropriate procedure in each specific instance and took care to prevent the development of any local nuisance, such as pollution of water supply or shellfish beds.

Bathing facilities were greatly in demand in the yards, and wherever possible shower baths were installed, with dressing rooms supplied with lockers for properly keeping the clothing. Special attention was given to washing facilities in the case of painters as a protection against lead-poisoning.

Inspection of Food Supply.—The menace of impure food had to be dealt with in a number of instances. The lunch rooms and restaurants in the shipyards and the outside eating places used by the shipyard employes were carefully inspected by the department. The care of kitchens, ice-boxes, and dish-washing machines was watched, and all food-handlers (waiters, scullery men and cooks)were examined for disease.

A special point was made of dish-washing, which was accomplished by patent dishwashers in which boiling water was used, the dishes being dried without handling. An epidemic at Los Angeles was traced to insanitary food supplied in Greek restaurants and it was necessary here for the department to have about thirty eating places condemned in order to handle the problem.

Housing.—Close affiliations were established between the Health and Sanitation Department and the Housing Department of the Corporation. By assisting in the selection of sites and by consulting with the local and state authorities, the sanitary experts were able to advise the Housing Department in many matters pertaining to drainage, sewerage, water supply, etc. Many elaborate housing projects were being carried on under the supervision of the corporation, and in each of these a physician and nurse were maintained, which proved of a particular value when the epidemic of influenza came.

As to the living quarters of the men, careful standards were insisted upon. The hotels, barracks, and bunk houses were watched to see that they were properly ventilated and kept clean and sanitary. The beds were placed at proper distance in the bunk houses and were separated by beaver boards. Special attention in the houses was given to adequacy of air and light, sanitary equipment, opportunity for recreation, laundry facilities and janitor service. The department invited the submission to it of all housing projects and proposed industrial villages.

Conclusion.—In November, 1918, the functions of the department were taken over by the United States Public Health Service, but the changed conditions following the signing of the armistice made it appear likely that no funds could be assigned by the Shipping Board for the coördination of this work. Owing, however, to the organizing work which has been done and the great interest stimulated among the yards it will be possible for the activities to be continued in large measure in peace times under the auspices of the yards themselves.

As in all matters pertaining to medicine, surgery and sanitation, exact figures indicating accomplishments are not procurable. The department was more interested in producing results than in recording them in elaborate tables and files, and the frequent labor turnover together with the fact that many of the workers were housed in cities rendered impossible the compilation of such comparative disease or mortality rates as would measure the results of the department's efforts. The effectiveness of its work may be judged by the fact that in no case has a general cessation of work due to disease occurred in any of the yards and there was no epidemic of typhoid, small-pox or other virulent disease, with the exception of the Spanish Influenza. During a winter of unusual rigor and severity and in spite of the exposure incident to shipbuilding, there were comparatively few cases of pneumonia in the shipyards, the proportionate mortality rate from these causes being much less than for the Army.

But the fruits of the department's efforts cannot be brought within any statistical reckoning. There has been a quickening of interest throughout the whole field of shipyard management. The employer has been shown the great advantages of sanitation, while the shipyard worker has taken to heart many lessons of personal hygiene and has learned the importance of working under conditions which keep him in health and in a contented state of mind. This alertness of the worker to matters affecting his physical well-being will necessarily react upon the employer as well as upon the public in general. Local civic bodies have been stimulated to put sanitary improvements into effect in and around their towns and cities and the hands of the constituted officials have been greatly strengthened by the awakening of public sentiment to the problems of community health.

Under the spur of an imperative emergency when the conservation of man power demanded the utmost attention to the health of every available worker, things have been accomplished which normally would have been thought impossible. "It can't be done—but here it is"—this was the motto of the Emergency Fleet Corporation which broke the world's records in shipbuilding, and this was the spirit which animated the whole Department of Health and Sanitation. By the use of direct methods, by daring the impossible and by an unbounded confidence which regarded obstacles as trivialities, the department was not only able to "carry on" in its difficult field of endeavor, but was able to launch an influence whose momentum will continue to operate now that the organization has been disbanded. The work of the Department of Health and Sanitation of the United States Shipping Board Emergency Fleet Corporation will live long after the necessity for shipbuilding has been forgotten.

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THE AMERICAN RED CROSS ASSISTANCE TO THE UNITED STATES MEDICAL DEPARTMENT IN THE UNITED STATES

By Lieut. Col. C. H. CONNOR, M, C., U. S. Army

(Concluded from August issue)

More than 100,000 demobilized men were aided by the canteens in the city of Philadelphia, alone, during the month of December, 1918. Every man in uniform knew that he could find a friend in the American Red Cross canteen. The war was over; the stimulus of the excitement of winning the war had passed, but the wonderful women of American Red Cross canteens stood by their posts and refused to leave them until the need had entirely passed, and the last man was demobilized. It is not excitement these women are looking for; they know their duty and they will stand by their posts until their duty is performed.

A Welcome Home Roll was arranged by the canteens throughout the country. Each man was asked to register upon his arrival in his home so that his name could be published in the papers for his friends to know of his safe arrival; his name and address were turned over to the Home Service section, which would aid him in his domestic affairs, and assist him, if necessary, in securing employment.

Expenses of operating American Red Cross canteens in the United States and Canada are met by three different sources, viz: (1) Appropriation by the War Council; (2) appropriations by the Chapters; (3) donations to the canteens.

1. The War Council appropriated for this six-months period $250,000.00 for canteen work at embarkation and debarkation ports, and for the general expenses of providing canteen service at important railroad junctions throughout the country. Expenditures under this appropriation amounted to $149,632.61 and were distributed as follows:

Newport News	$81,842.85
Halifax	17,528.37
Washington, D. C	10,651.22
Montreal	9,415.10
Port of New York	4,514.06
Supplies furnished various Chapter canteens	25,681.01
	$149,632.61
Unexpended balance returned to American Red Cross Treasury	$100,367.39

2. The cost of canteen service in the chapters amounted to $554,257.09, all of which was financed from chapter funds. The following table shows the distribution of expenses by divisions:

Division	*Cost*
New England	$10,390.44
Atlantic	122,087.29
Penn-Delaware	67,836.19
Potomac	68,675.61
Southern	56,498.26
Lake	52,376.21
Central	58,811.99
Gulf	20,954.30
Northern	5,324.23
Southwestern	54,078.33
Mountain	8,975.36
Northwestern	8,877.53
Pacific	19,381.35
	$554,257.09

3. The value of supplies donated amounted to $193,604.25. The following table shows the distribution by divisions:

Division	*Value of supplies donated*
New England	$626.66
Atlantic	52,219.69
Penn-Delaware	24,958.94
Potomac	21,296.05
Southern	28,226.23
Lake	15,467.69
Central	10,352.10
Gulf	4,199.70
Northern	1,868.10
Southwestern	15,789.10
Mountain	4,431.67
Northwestern	7,472.29
Pacific	6,696.03
	$193,604.25

4. In addition to expenses incurred by the canteens for furnishing free service, supplies were purchased by the canteens on request of troop train officers to the total amount of $37,946.56. Reimbursement was made by troop train officers for these supplies.

5. Summary of expenses of canteen service is as follows:

National Headquarters	$149,632.61
Chapters	554,257.09
Donations	193,604.25
Expenses reimbursed by troop train commanders	37,946.56
	$935,440.51

6. Estimate of number of canteen services performed during twelve months' period ending December 31, 1918.

Soldiers	41,474,400
Sailors	2,016,552
Marines	437,712
Draft men	4,912,680
Total	48,341,596
Sick men aided en route	103,752
Sick men removed from trains	7,056

There were approximately 55,000 volunteer women workers in the American Red Cross canteens. No commercialism whatever was permitted to enter the work; no money exchanged hands between the individual soldiers and the canteen workers—all service was gratis. The record of the Canteen Bureau is a tribute to the efficiency, patriotism and devotion to duty of the wonderful American women of whom its entire membership was composed. It was a woman's task and the women of the country responded without hesitation and without limitation. It is believed that there was not a man in the service, soldier, sailor or marine in this great war who did not, at some time in his military career, partake of the hospitality of the American Red Cross Canteen Service or receive aid in some way from this bureau.

RED CROSS INSTITUTE FOR CRIPPLED AND DISABLED MEN

The importance of the problem of the reconstruction of American wounded soldiers and sailors engaged the attention of the Department of Military Relief soon after the declaration of war and an institute for the reëducation of cripples was started in New York City.

In order to put the institute on a practical working basis classes were begun for cripples from civil life and the teachers were trained in the handling of cripples. Various courses were inaugurated, such as artificial limb-making, draughting, operating moving-picture machines using linotype and monotype machines, oxy-acetylene welding, stenography and business courses. An employment bureau for the placement of cripples was established and surveys of industries made to find suitable employment for the disabled.

The reconstruction problem was studied from all angles by collecting all the available information from the belligerent countries on the subject of rehabilitation, and the institute soon became an authoritative source for all who sought the latest information from abroad.

In order to truthfully inform the American people as to the possibilities of reconstruction a campaign of public education was initiated, approved by the Surgeon General. Posters, booklets, moving-picture slides with lectures, were utilized. A popular magazine, *Carry On*, was financed by the American Red Cross and edited by the Surgeon General, in which the problem is discussed in an intelligent way, so as to place it before the people.

The theory of the institute is that the cripple, properly trained and placed, can produce as efficient service as the able bodied. Sentiment does not enter into the program. The cripple's compensation rests on the firm foundation of work accomplished and not on his employer's compassion for his physical condition.

This program, successfully carried out, means that no crippled soldier will ever have to depend on patriotism for his existence, he can enter the field of industry on an equal footing with his more fortunate companions, and the pension granted him by the Government can go towards giving him additional comforts, but not represent his only means of sustenance.

RED CROSS INSTITUTE FOR THE BLIND

The Red Cross Institute for the Blind, organized in connection with U. S. A. General Hospital No. 7, was originated by Lieut. Col. James Bordley, Medical Corps, U. S. A., for the purpose of guiding the work which the Red Cross wished to do for the benefit of American soldiers. With the authority of the Surgeon General, Colonel Bordley was made the Director of the Institute and it is entirely due to his able services that the Red Cross has been able to accomplish this work.

A suitable building, adjacent to the hospital, was secured and is used as the headquarters for the Red Cross work, and as a convalescent recreation house for the blinded men. Additional quarters in the city of Baltimore are available as a home for the relatives of these men, when they come to visit or to take the course of instruction to fit them as companions for their blinded husbands, brothers or sons, it being considered essential that the blind man have a trained companion to guide him through his future of darkness. The relatives are trained to read and write Braille and look after the blind man in every way.

The Red Cross Institute has been able to add to the salaries of the trained teachers, so that those who could not afford to give their services for the salaries allowed by law, could be secured, hence we have the best available material for the work. No comprehensive survey of industry for the placement of the blind had ever been made, and it was essential that information of this sort be obtained, hence the Red Cross employed expert industrial engineers to find out what industry could do for the blind, so that the vocational training could be carried out along scientific and sensible lines. The results of these surveys demonstrate that blind men can be employed in many industries and, when properly trained, will render very satisfactory service. It means that hereafter there will be no good reason for the blind mendicants who are now scattered over our cities as a pathetic reminder of this formerly helpless class. The blind no longer need to lose their self respect, they can compete on the basis of efficiency with their sighted brothers and can command equal compensation for services rendered, in many cases, more satisfactorily than by those who see.

Through its volunteer workers, the Red Cross Institute was able to provide teachers to teach the men sufficient in number to give each man an individual teacher, an absolute necessity in such technic work as teaching Braille, and the use of the typewriter; also in training the hands, as in weaving nets, baskets, hammocks, or simple cabinet making and carpentry; also in training the ears, as in piano tuning, which develops the hearing, an important asset to those who cannot see.

In all this work the Red Cross has been the assistant to the Surgeon General, and has not sought, in any way, to duplicate the work of the Army.

The Red Cross will continue its interest in these blind soldiers throughout their lives and has made provision to carry on its work in their behalf indefinitely.

THE FIRST-AID DIVISION

The First-aid Division of the American Red Cross has been engaged in disseminating instruction to the people of the United States so that they could take better care of themselves in cases of minor injury and in this way, lessen the more serious results that so often follow the neglect of what may seem but trifles at the time. It was hoped that the services of our trained nurses could be conserved and a greater number released for the far more serious work they had to do in caring for those who were wounded in battle. The great effort to enroll enough trained nurses has not resulted in obtaining all that are needed. And since it was foreseen that this would be so, it was felt that the services of aides must be utilized, hence, a training in first aid was, and is, considered a ground work on which untrained women could build, towards a larger knowledge of this work.

On the theory that a little training properly given is obviously better than none at all, we induced thousands of our people to make the start by taking this course, and at no time feeling that a course in First-aid would qualify anyone to care for the sick, we feel that this course would help those suddenly called upon in an emergency.

The majority of the graduates in First-aid are intelligent, common-sense Americans, anxious to help in a work that needs assistance, so that as no other means of education offered, they took what was to be had. The American Red Cross believes that First-aid as taught in its classes is well done, and that these graduates, when carefully selected as to fitness, would be of immense assistance to the Army Nurse Corps in a task that is beyond its power of accomplishment, namely giving adequate care in the military hospitals to our sick and wounded.

Under the supervision of the nurse in charge of the ward, these women could help tremendously in serving the diets in a tasty manner, a thing which is so much appreciated by the sick. They could be trained in a short time to make beds, give baths and help out the nurses in many of the routine, time-consuming duties which are essential to the proper care of all patients in hospital.

BUREAU OF SANITARY SERVICE

The Bureau of Sanitary Service, was established in July, 1917, to give aid to Federal, state and local authorities in securing and maintaining effective sanitary control in the civil districts surrounding or adjacent to National Army cantonments, National Guard camps and naval bases. The United States Public Health Service is, by law, empowered to coöperate with state and local authorities in the prevention and control of communicable diseases. Because of the necessity for speedy action in effecting the sanitary control of extra-cantonment areas, it seemed warranted for the American Red Cross to coöperate with Federal, state and local authorities in this national emergency. The United States Public Health Service detailed one of its officers to act as Director of the Bureau of Sanitary Service.

Thirty-six Sanitary Units were established, as follows:

City	*Camp*	*City*	*Camp*
Columbia, S. C.	Jackson	Montgomery, Ala.	Sheridan
Little Rock, Ark.	Pike	Charlotte, N. C.	Green
Louisville, Ky.	Taylor	Waco, Texas	McArthur
Des Moines, Iowa	Dodge	Alexandria, La.	Beauregard
Leavenworth, Kans.	Leavenworth	Wrightstown, N. J.	Dix
Hattiesburg, Miss.	Shelby	Augusta, Ga.	Hancock
Petersburg, Va.	Lee	San Antonio, Texas.	Travis
Anniston, Alabama	McClellan	Houston, Texas	Logan
Newport News, Va.	Newport News	Portsmouth, Va.	. . . .
Ayer, Mass.	Devens	Jacksonville, Fla.	Johnston
Atlanta, Ga.	Gordon	Portsmouth, N. H.	. . . .
Chillicothe, Ohio.	Sherman	El Paso, Texas	. . . .
Greenville, S. C.	Sevier	Alexandria, Va.	Humphreys
Macon, Ga.	Wheeler	New London, Conn.	Naval Base
Manhattan, Kansas	Funston	Charleston, S. C.	Army and Navy Base
Chattanooga, Tenn.	Oglethorpe	Lawton, Okla.	Doniphan
Spartanburg, S. C.	Wadsworth	Fayetteville, N. C.	Bragg
American Lake, Wash.	Lewis	Washington, D. C.	. . . .

The personnel of each unit consisted of: Director, U. S. P. H. Officer (Services paid by U. S. Government); Fiscal Officer, (Services free); Bacteriologist, Sanitary Inspectors, Red Cross Trained Nurses, all paid by the American Red Cross.

The measures to be controlled consisted of: Supervision of public and private water supplies.

Proper disposal of human excreta.

Proper disposal of manure, garbage and other wastes, especially to control fly breeding.

Proper control of food supplies, requiring constant inspection of dairies, markets, restaurants and refreshment stands.

Direct control of all communicable diseases, with full and prompt report of all cases, and establishment of necessary isolation and cure.

Vaccination of all possible people against smallpox and typhoid.

One of the major problems was the prevention of malaria by the eradication of the anopheles mosquito, which was accomplished by draining pools and marshes, channeling water courses, and oiling all ponds of still water. The public were also urged to take quinine, and they were further instructed to erect screened, fly proof privies. Conditions in this respect were found to be most lamentable. Wells were found adjacent to privies in thousands of yards. Open sewers were common. Butcher shops, with meat displayed on open counters, covered with flies; filthy restaurants, springing up like mushrooms, seeking the soldier trade, flourished near all the Army camps. A reprimand from the director to the proprietors of these shops usually failed. All was not wilful negligence, but ignorance. They had never been told to do otherwise, or shown different ways. These conditions were changed. A call for help to the adjacent division surgeon brought the military police, with authority to stop any uniformed man attempting to enter an inspected and condemned eating establishment, "out of bounds." The proprietors soon realized that there was to be no trade without cleanliness.

The Red Cross and the U. S. Public Health Service did not undertake to treat sick men in the Army camps. Their field lay in keeping the people well who served the soldier and sailor so that no contaminating disease might spread from city to camp. To further this idea and to meet what proved to be the greatest single source of soldiers' illnesses, twenty-six venereal clinics were established in as many cities, where units were existent. These clinics were free and cases of syphilis and gonorrhea flocked to them by the thousands. Fully forty thousand civilians were treated in these clinics. Salvarsan or arsphenamine were sent to the venereal specialists in charge of these clinics by the thousand doses. A male and female nurse in attendance morning, noon and night helped administer both treatment and advice. In five cities: Chattanooga, Newport News, Alexandria, La., El Paso and Petersburg, Va., isolation hospitals for venereal patients were established and maintained.

The necessary authority to maintain health standards was vested in the U. S. Public Health official, the director of the unit, delegated to him by local, state, municipal and county authorities, this condition being made by the American Red Cross before they agreed to establish a unit. Funds to meet the requirements were almost totally lacking, locally. So the Red Cross and the U. S. Public Health Service had to help. Contributors to the Red Cross gave their money to help win the war and keep their sons and husbands well. Prevention of illness is the best medical standard today, and to keep well is better than to be made well. The standard of health throughout the Army camps was raised by the results accomplished by the sanitary units.

SURGICAL DRESSINGS AND HOSPITAL GARMENTS

With the development of the Red Cross organization the efficiency of Chapter workrooms increased so that by the end of 1917 it was evident that it would be possible to provide surgical dressings in almost any quantity needed.

Therefore, after a conference between the Surgeon Generals of the Army and Navy, a plan of production was elaborated whereby the Government was to furnish the material and the Red Cross to make up the dressings needed by the military and naval services in accordance with specifications outlined.

The first order for surgical dressings was received March 8, 1918, and was to be delivered in thirty days. This order was as follows:

Packet No. 1. Red label	600,000
Packet No. 2. White label	500,000
Packet No. 3. Blue label	400,000
Gauze rolls, 5 yard	8,000
Gauze rolls, 3 yard	10,000
Sponges, small	400,000
Sponges, large	350,000
Sterile dressing pads	300,000

Unsterile Dressing Pads

Type 1, size 1	200,000
Type 1, size 2	150,000
Type 2, size 1	75,000
Type 2, size 2	50,000

The unsterile dressing pads of various types and sizes and the sterile dressing pads corresponded very closely to standard Red Cross dressings, and to expedite delivery arrangements were made with the Medical Department to accept on this first order a delivery of standard Red Cross dressings which most nearly conformed to the dressings mentioned above.

Order No. 2 was received April 18, and was a duplicate of No. 1 with request that these quantities be furnished monthly for a period of five months. Later, on more complete service from France, the Medical Department requested that we modify the order so that the total number of front parcels would be 4,500,000.

In May, we received the first order for other kinds of dressings, including pneumonia jackets, scultetus and many-tailed bandages, and from that date to the middle of September we received several orders for various Red Cross standard dressings and other special dressings made in accordance with specifications furnished by the Medical Department. The order included such dressings as oakum and sphagnum pads, supporting slings of different sizes, traction bands, weight bags, heel rings, and triangular bandages.

After the signing of the armistice, orders unfilled at that time were cancelled, except for such dressings as were made up or in process. The total deliveries of surgical dressings to the Medical Department of the Army up to February 1, 1919, is as follows:

Weight bags	1,040
Elbow traction bands	1,500
Many-tailed bandages	220,436
Scultetus bandages	65,192
Gauze compresses (sterile dressing pads)	3,276,590
Gauze compresses	1,006,843
Pneumonia jackets	56,199
Oakum pads, size 1	56,235
Oakum pads, size 2	7,918
Sphagnum moss pads, size 1	30,695
Sphagnum moss pads, size 2	13,605
Unsterile dressing pads:	
Type 1, size 1	1,237,907
Type 1, size 2	966,592
Type 2, size 1	435,926
Type 2, size 2	288,513
Front line parcels, red seal	1,801,995
Front line parcels, white seal	1,513,003
Front line parcels, blue seal	991,506
Heel rings	22,673
Gauze rolls, 3 yards	36,108
Gauze rolls, 5 yards	372,334

Small sponges	4,195,591
Gauze sponges (large)	1,952,983
Leg support	500
Arm support	701
Perineal support	500
Gauze wipes	1,372,059
Slings	122,675
Total	20,047,819

At the time the original agreement was entered into regarding surgical dressings, Red Cross furnished the Medical Department of the Army with models of some of its hospital garments and supplies. No orders for this type of articles were placed at that time except for a small quantity of Red Cross convalescent suits which the Medical Department desired for immediate use in some of the hospitals here. The latter part of June, however, the Surgeon General's Office informed the Red Cross that as soon as the Medical Department could furnish material we would be called upon to make up certain hospital garments. The first order for these was for: 1,350,000 pajamas; 500,000 operating gowns; 1,736,000 bed shirts; 170,000 convalescent robes.

To expedite delivery, we were allowed to deliver Red Cross garments, and later, because of unavoidable delay which the Medical Department encountered in securing materials, to use Red Cross supplies which were later to be replaced with government fabrics. Government models corresponded very closely to Red Cross garments except in case of the pajamas, and Red Cross pattern for this garment was later revised along lines of government specifications. All garments made by the Red Cross for Medical Department of the Army, except for the first lot delivered from Red Cross stocks, bore the following label: "Materials furnished by Medical Department, U. S. Army and prepared by American Red Cross."

After the signing of the armistice a part of the orders for garments were cancelled, except for those in process, and other orders were modified to meet changed conditions. Up to February 1, the Red Cross had delivered the following quantities:

Operating gowns	85,707
Bed shirts, summer	704,647
Bed shirts, winter	160,604
Pajamas, American, winter	389,910
Convalescent robes (bath robes)	136,261
Total	1,477,129

In addition to the above, on November 18, we received an order for 100,000 convalescent suits for use by our returned wounded in military hospitals in this country. Because of the failure of manufacturers to make deliveries to the Government promptly, this order was later cancelled and only a few of the garments delivered.

At the time the agreement was made it was the belief of the Medical Department and ourselves that a fairly even balance between the two, either for materials or for finished dressings would be maintained. Because of unavoidable delays in securing material, however, and the fact that the Red Cross was able to make delivery of large quantities of finished articles from stocks made up for distribution through its own channels, the balance in favor of the Red Cross in material, according to agreement, kept increasing and had reached a very considerable sum by December 1, 1918. As Red Cross requirements for surgical dressings and hospital supplies, after the cessation of hostilities, could be met from stocks already on hand, negotiations were entered into with the Medical Department of the Army to secure a settlement of the balance in our favor by a cash payment rather than return of material as originally agreed. Such a settlement was satisfactory to the Medical Department, and the final details are now being worked out between the department and the Red Cross.

REMARKS UPON PAEDIATRIC CONDITIONS IN FRANCE, WITH REPORT OF A COMPLICATED CASE[1]

By Lieutenant Colonel EDWARD M. COLIE, Jr.

WHEN the mobilization by Russia gave to the German High Command the long awaited and carefully prepared for opportunity to launch the lightning campaign which should for all time cripple France as a commercial rival and wrest from her the iron and coal producing lands of her eastern border, the well ordered machinery started to roll, and the German Army, to a man, appeared for the first time in their new gray drab field uniform. For the campaign proposed Germany was prepared. It was to be a six- to ten-week overwhelming campaign against France and, after that was settled, a concentration upon the more extended Russian front, which would be slower because of the greater extent of the frontier. The Russian Army driven back and eventually reduced to demanding a cessation of hostilities upon German terms, the conquered areas in Russia were to be consolidated as an integral part of the German industrial system, meanwhile Austria was to concentrate upon the reduction of the southeastern portion of Europe for the furthering of the "Berlin to Bagdad" dream of empire. As far as the planned campaign went, Germany was prepared to the full extent of the needs of the army and was also prepared for the proper husbanding of the civilian resources of the empire. This latter included a thorough systematization of the medical resources of the empire, so that while there was a thinning out of the medical service available in the hinterland, the distribution was so planned as to render this thinning out of the least practicable importance.

Upon the other side of the line, as was amply foreseen by the proponents of the plan of campaign, the condition under which the war started led to a very different state of affairs. France with her regular and available reserve forces was thrown into the field upon a few days' notice. All available classes were called and there was little or no time to cull out the men required for the maintenance of the vast supply resources imperatively required for the sustaining of the army and for supplying it with food and munitions. One of the shortages thus early developed was in the supply of medical men who were heavily drawn upon from the start. As the pressure of the war increased instead of abating the demands and drafts increased. As is common knowledge now-a-days, in spite of their magnificent spirit, and supported to the utmost by the population at large, the French Medical Department proved quite unequal to the task imposed upon them during the period of invasion. Movement was rapid, continued retreat meant inevitably the sacrifice of positions and of the supplies in those positions, and there were in addition large captures of troops with their medical personnel and supplies. As an illustration of what this can mean as a complication in such a situation, let me cite a conversation with a French Commandant of the Medical Department, at Villers-Cotterets in August, 1918. I asked him why the French were sending to the rear so many seriously wounded who had not yet been operated upon. In brief, he told me that in the neighborhood of Soissons the French had lost in one German drive 40,000 hospital beds with all of the equipment that went with them, that since that occurrence the Service de Santé had forbidden the carrying of anything like operative equipment up into the Zone of the Armies. Think for a moment what that means, and think how great was the necessity for conservation which dictated such a policy.

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[1] Read before the Association of the Alumni of the St. John's Guild Hospitals for Children, April 13, 1920.

As the area of the invaded regions, later properly designated as the devastated regions, increased under the steady progress of the enveloping German advance there came into being a change in the type of warfare and a change in the morals of warfare—involving a reversion to the type of the first five hundred years of the Christian Era. This form of warfare was instituted under the theory that the regions were to be held for subsequent German development, after depopulation. And this depopulation was the result of a deliberate commercial plan, conceived with the idea of freeing the later German development from the trammels and impediments to be anticipated from the remains of the original holders of the land. *Schrecklicheit* on the scene of invasion and occupation, mass deportation to German soil, combined to produce conditions which have not been seen elsewhere for 1,500 years, and as the population was more dense than in those older times the intensity of the process was enhanced to a proportionate degree. The effects of the process beggar description The remainder of the population could not live upon the land nor under the conditions of occupation. They fled. Whither? Southward and westward ahead of the invaders —the Hun—through the Belgian and the French and, later, through the British lines to find what asylum the interior of the uninvaded country afforded. If, in the early days, following the first Marne battle, the German line recoiled, part of the emigrant wave flowed back to reclaim the wasted farms. When later invasion again drove them out, as occurred more than once, they fled again, this time poorer and in worse condition than upon the former emigration. During the German offensive of April and May, 1918, wave after wave of these refugees came into the Department of Calvados where I was then located. There resulted from this forced immigration a further increase in the density of the population in interior parts of France.

Summed up, therefore, we have, eighteen months to two years before our entry into the war, these conditions present in the interior of France:

(1) A civil population stripped of all men between the ages of 18 and 45, save for a small number of the physically unfit, and of war cripples (*rifformeés*) returned to civil life, alike unfit either for further military duty or for any active arduous duty in a civil capacity.

(2) A varying increase in the number of mouths to feed, without any substantial increase in the wherewithal to feed them. If they had available cash to buy there was little to be bought that would serve their turn. Few had any spare cash.

(3) A general restriction of the common articles of diet, most marked in those elements which are available for child feeding.

(4) The further complicating fact that the withdrawal of the medical portion of the population was disproportionately large, and that the disparity was further increased by the presence of the refugees.

Now to quote in a very general way a few illustrations from those regions in which I was stationed at some time or other and where I remained for sufficient time to feel in some degree the pressure in this respect to which the people were subjected. At Autun, in the Department of Saone et Loire, an agricultural region well known throughout France for its *Morvan* cattle, magnificent large white beasts, a grazing country upon the hillsides, grain growing in the valleys and along the streams, there was in 1915 a population of 15,500. The town is the seat of a college of the same name which has borne an honorable reputation since the 15th century. There were located here a medical man and a dental surgeon, both under the orders of the Service de Santé. The dentist was restricted to the town and such as consulted him had to go there to see him. The doctor had, in a general way, a surrounding territory with an average radius of 15 kilometers to cover. He was provided with a horse and cart for this purpose.

In the 18th Training Area in the Department of the Haute Marne a military doctor was located at Montier èn Der, a town of 1,500 inhabitants. This was the source of medical attention for towns as far distant as Anglus, 30 kilometers. This region was, to be sure, a farming region, towns were small, often hardly more than hamlets. In this region the doctor's transportation was by automobile, for this was near the front and a training area into which troops were continually pouring and from which they were departing for the line. This Medicin Militaire had almost all of his time occupied with military duties. He had little time to devote to the needs of the civil population. Such men were so overworked that, with the very best of intentions, they could not possibly cover the areas in which they were located. These conditions obtained generally for more than two years without amelioration in sight, the war was continuing, getting to be, if anything, worse in its demands rather than better. Men and doctors were required for replacements, if the line was to be held, and yet more of both classes were required if the armies were to be increased to a point where even a limited offensive could be undertaken.

When at last we got into the war and got troops over there, there were several ways in which we helped to mitigate the burden of this state of affairs. The military end of it is far too well known to you all to require any word from me. But there are several things in this connection which you may not know and of which you may be glad to learn, as I was. Into some districts there had been sent at the request of the French Service de Santé little units composed of an American medical man with a nurse who was in many instances also an interpreter, and a driver with a Dodge car. In the district, Bourmont-Neufchateau, in the Departments of Haute Marne and Vosges was one of these older men, not quite husky enough for regimental or field work, but amply able under the conditions of service there to do excellent work. Picking him up one day as I was hitting the road for the 20 kilometers between Bourmont and Neufchateau and grubbing a lift for a part of the distance, I learned from him that since he had arrived in the district he had established a chain of dispensaries in the hamlets and towns of the district and that he was in the habit of visiting them on a schedule. He said that his chief care was pediatric practice and that he had reason to be well pleased with the results of his work during the course of the six months that had elapsed since his arrival. He was under the immediate orders of the American Red Cross and was drawing his supplies from the Base Hospital at Neufchateau. There were great limitations upon the spreading of this sort of service, but when installed it was of enormous value to the communities served, filling what, during four years, had been a dire need. This service made a very distinct and measurable impression upon both the morbidity and the mortality of the districts in which it was established.

Bearing in mind the conditions thus broadly sketched above, let us take a closer view of a small commune and see what were the conditions there, and after that take up the consideration of a single case the details of which I became rather familiar with. Saturday May 18, 1918, at 5 p. m. Hospital Train No. 58 pulled into the railway siding at Brion-Laizy for a short period in garage, so that the unit could familiarize itself with its new equipment. The town is a small one with a population of perhaps 500 to 800 situated in the Morvan Valley in the midst of a hilly grazing and agricultural country. As I later learned from the mayor and from others, the nearest medical attention was from Autun thirteen kilometers up the line. In the late afternoon of Sunday, the day following our arrival, there came to the train, seeking a doctor, a one legged Frenchman aged about 35 who asked me if I would accompany him to a neighboring farm, distant about a mile and a half, and see a small girl, his daughter, who was very sick. As we plodded along the mile and a half uphill, and it was not easy for him with his newly acquired timber toe, stopping now and again so that he could get breath, for he had by no means recovered from the results of the gunshot and the amputation done the previous autumn, he told me this story of "La Petite Malade," When he was invalided out of the army the entire family, of which he was the sole support, had come here from Paris with him. Paris was full. There were more mouths to feed than supplies with which to fill them, work which he could do in his present condition was not to be had there. As a gap stopper had he come here as a tenant farmer. Three months before this his oldest daughter, Marie Louise, after a period of poor health, of which the cause had not then been determined, had one night been seized with violent abdominal pain accompanied by vomiting, and, as there was no getting the doctor from Autun they had to fall back upon what they recognized to be inadequate family medicines. In the course of some days the pain subsided although the patient was obviously sicker and not better. At this point they learned that an American Hospital Train had appeared upon the siding at Brion-Laizy. He applied there for assistance and Major Webb, M. C., and one of his lieutenants examined the patient, finding her very toxic with a large peritoneal abcess undoubtedly of appendiceal origin. Without much ado, in the one room of the farm house, they prepared, anaesthetized and operated upon the patient. A large abcess was incised and drained, without effort to locate or to remove the appendix (this was learned from Major Webb at a later date). Three tubes were placed one up the right gutter, one down toward the region of the base of the appendix, one down toward the pelvis. Three days later the train was suddenly ordered away. For the better part of three months this patient was visited and dressed about every ten days by the doctor from Autun. He removed the tubes and upon the occasion of his visits dressed the patient. At other times the dressings were done by members of the family.

Stepping directly from the road through the doorway, I entered the single large room of a two-hundred-year-old farmhouse. It had a high peak thatched roof and stone slab floor, a single window and door on the front side, by which I had entered. In the opposite wall were also a single window and door, through which entered the rays of the setting sun. The ends were closed save for doors which communicated with dark storerooms at either end, and to the right, in the east wall, was an open fireplace at which all of the family cooking was done. When doors and windows were closed, and this is by far the most usual state of doors and windows in France, this fireplace was the sole method of ventilation. To the left of the fireplace, in the corner, was a feather four post bed in which slept the father and mother. Furniture was simple and there were few pieces. Such as there were were well built and of old handmade design. In spite of the lack of ventilation and poor light the place was obviously clean, almost obtrusively so. In the southwest corner opposite the door by which I had entered and near the door in the south wall was another feather bed. As I approached this bed I smelt old pus and lots of it, that unmistakable odor of chronic suppuration. Any approach by me was greeted with the pitifully weak cries of the apprehensive patient. She was a skeleton and little more. Examination showed a bad broncho-pneumonia well scattered through both chests, most marked below and behind. There were in the lower right quadrant of the abdomen corresponding with the operative incision two large fistulae pouring out intermittently over the excoriated abdominal wall most of the food which she had eaten and digested. She got little food and ate less. Emaciation and asthenia were extreme. She could not turn over in bed and had not been able to do so for weeks. If anyone attempted to turn her she howled. The heart was regular, rapid and weak, the apex impulse a mere flicker, even through that thin chest wall. Cough was frequent and exhausting. Sputum was abundant almost to the point of suffocation. Upon turning her upon her side, which had not been done for three weeks, there was revealed over the sacral region and the posterior portions of the crests of the ilia an area of deep decubitus ulceration 9 x 7 cm. involving the entire thickness of the skin and exposing, in its central portion, the aponeurosis of the erectores spinae. Above this the skin over the tips of the three spinous processes next above were threatening the same thing.

To me the child seemed to be in well-nigh hopeless condition. However, there are few situations, if any, so bad that it is not worth while trying to see what can be done. Therefore the family was instructed by me in the toilet of the sinus as well as in the application of pressure pads to favor the retention of and the circulation within the gut of the products of digestion. Crude distilled brandy and vinegar were the only substances available for dressing purposes. Monday I took with me one of my enlisted men, both that I might have his assistance in handling the patient and that I might give him the bedside instruction which could be got from such a case. We dressed the fistula in spite of the screams of the little patient, then turning her upon her side dressed the decubitus ulcer and cleaned up the threatened areas above. While this was going on I was actively engaged in explaining to the parents the absolute necessity of ignoring the protestations of the patient, and of turning her upon her side, alternating the sides every half hour, and never for more than five minutes in any half hour permitting her to lie upon her back. Tuesday I took with me another man and in addition to a repetition of all that I had explained upon the previous occasion, I urged the necessity of out-of-door treatment for the broncho-pneumonia. To the average person with the continental training there is no greater heresy than that of out-of-door treatment or of anything approaching free ventilation. The thing that they most abhor is a draft, or *courant d' air.* Wednesday when I called with a third pupil and assistant she was out of doors and had leaked less than upon the former occasions, and she had so far lost apprehension and gained confidence in us that there was nothing but coöperation upon her part. Apprehension of pain was present but she had confidence in us. The coöperation upon the part of the family had been frank and complete from the start, save as limited by their failure at the time to grasp what was going forward. This afternoon the frequency of her respirations was decreased from 45 to 30 per minute, without change in the physical signs. Caffeine, .06 every 3 hours was given from the date of my first visit. To this had been added brandy 8 cc. well diluted. On this day an egg was added to the diet and she took it with apparent relish. Thursday the scope of the treatment was enlarged to the extent that heliotherapy was instituted for the decubitus ulcer. This was accomplished by screening the wound from flies, which were more than plentiful, and exposing the patient to the rays of the 3 o'clock sun for five minutes. This treatment was carried out by increasing the period of exposure by five minutes each day, the treatment always terminating at 3 p. m. The reason for this arbitrary hour was to have the exposure made during the warm part of the day, also to have the end of the treatment come at a definite hour and thereby to minimize the danger of forgetting the patient and perhaps doing some damage at the start by adding an unnecessary sunburn. I visited the patient daily, demonstrating methods of dressing and toilet, for some time and later extended the intervals to every third and fourth day. The broncho-pneumonia largely cleared up in the course of ten days. The skin in the threatened areas became normal in color and circulation (normal for her condition) and the edges of the decubitus ulcer commenced to epithelialize over fresh and reddening granulations. Meanwhile appetite and general condition improved. The loss of weight ceased, and things had got into such shape that when I made my last visit on Saturday, 1st June, 1918, the day before leaving Brion-Laizy, I saw a very tearful young lady, very weak and emaciated, but improving, who was very glad to give me a hand-shake upon leaving. This meant much to me for at the commencement the dressings were accomplished by little short of brute force, certainly a very uncompromising persistence had been necessary to effect any examination or dressings. During July, 1918, while I was stationed at Pantin, I received occasional letters from Brion-Laizy reporting the progress that the patient had made and asking advice and details of further treatment. Among other letters of this sort is one received by me at Buzancy shortly before the armistice, asking whether, in my opinion, it would be safe to take her to Bagnolet, a suburb of Paris, where her father could get a better job when winter came on. I wrote them that if they would keep her out all day in the Butte Chaumont, which was close at hand, that she would continue to do well. I further told them that there was more than a possibility that the fistulae would not close spontaneously. They did not close and in January of this year I received a letter with a photograph of the patient. This letter reported that she had so far recovered that the presence of the intermittently discharging fistulae was the only thing that stood between her and health, and that, following my advice, she had entered the hospital. That the tract had been dissected out and gut aggregating twenty inches had been resected. That the number of perforations of the gut persisting at the time of operation was five. The same letter went on to say that there had been an uninterrupted convalescence and that she had returned to her home in good condition. So much for the case of Marie Louise Callomby. I hope that she never has any more illness up to her last, for she has already had far more than her share in this one experience. Operative surgery has in this instance stepped in upon two occasions greatly to the benefit of the patient, but far more important is the general surgical aspect of the treatment, the item which in this particular case was of prime importance in shaping the outcome. In this respect this case closely parallels many of the eleven thousand odd cases which were treated on Hospital Train No. 58, where the treatment was general surgical rather than operatively surgical. In peace time civil practice where by far the greater majority of our operative cases run a rather smooth course we are a trifle prone to forget the importance of this side of the practice, I mean the surgeon is, I do not believe that the internist does slip in this matter. It is this thought which has prompted me to report this case this evening.

At Pont l' Eveque and later at Pantin there arose no pediatric problems so far as I was concerned, for the community was supplied to the necessary degree, as far as my observation went. Births were few and there were few nurslings to be looked after. Few pregnant women were to be seen upon the streets. In the more advanced locations, as at Sermaise les Bains, which had been at first overrun by the Germans, but had been in French hands since the first battle of the Marne there were few children under 5 years old. There was no doctor. In the town which I visited within the zone of operations there were no women and no children. Save for a few scattered old people there was no civilian population. At Chateau Thierry I saw two boys with whom I conversed; they were respectively 11 and 12, I saw no small children there. In advance of this I saw no women or children until the German retreat in the Meuse-Argonne region was well established. Then the first wave began slowly to return toward their home towns at the base of the Argonne Woods. These first were a handful of old women with one or two younger ones who had a couple of children, 4 and 8, with them; these subsisted by doing laundry work for the troops established there from time to time. They had not been at Les Islettes two weeks before, when I was down there for the night. When we were at Buzancy I had occasion to go back again to Les Islettes, and I saw the same two children. Their presence in that mass of troops was a trifle incongruous, but one had got used to seeing troops with children, and one soon got to realize that a child had about as many friends as there were men present. I never saw a soldier who was a "child hater" or child shy. Here also at that time there were no pediatric problems; these children had weathered much in the past four years, and were of selected stock, of sufficient resistance to cope with their environment. There are in France today many children who have survived under these conditions of life, but that number is small when compared with the normal number of children for the five year period. The birth rate has been small. The death rate has been high, but this has varied with the part of France; in the southern and southwestern areas the death rate has not been affected very directly by the war conditions, but as one approached the line this became less and less true. In these regions the food situation had very largely contributed to an abnormally high mortality rate in the first three years of life. There are other elements to be considered and one of them is that much as they pride themselves upon their dairy products, they do not know what clean milk is. Their methods are as antiquated as is their tolerance of the housefly. In the group of towns, Thilleux, La Greve, Sauvage Magny, Anglus and Rosieres, in the Haute Marne where the 60th Artillery was stationed for a month, and where I had the opportunity to study conditions in some degree, there was but one source of water which was not grossly contaminated with B. Coli. The reason is not far to seek. The soil is a gravel and loam overlying a rotten limestone at an average depth of 8 feet. In the town of Thilleux there was one pit latrine and that was back of the mairie and schoolhouse which were located in one and the same building, next to the church. Elsewhere urination and defecation were accomplished in or about the manure piles, which were found in every yard. To accommodate the 60th Artillery, which increased the population markedly, deep latrine pits were dug and used. Surface contamination was the rule. Cold water is used for household and utensil washing, ergo, milk is very largely colon contaminated and that very generally throughout the rural districts in which I had the opportunity to make any observations. As there is no general refrigeration, milk is consumed or converted into butter and cheese almost at once. Therefore only occasionally does the contamination have the opportunity to multiply in the milk medium. Were conditions different, I hate to think of what might happen.

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FOOT ABNORMALITIES AND THEIR MANAGEMENT IN THE LIGHT OF ARMY EXPERIENCE

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IN the early days of mobilization much difficulty arose concerning the handling of foot cases. This article is based on over a year's experience in dealing with such cases in Base Hospitals, on Examining Boards and in Development Battalions. In a recent number of The Military Surgeon an article was presented dealing with the military side of the problem. This article proposes to deal with the orthopedic side of the questions involved.

For the practical management of these cases three questions required solution: (1) What should we consider as a normal foot? (2) What are the causes of foot trouble? (3) What is the most practical method of treating foot cases under army conditions?

An opportunity for the study of normal and abnormal feet on such an extensive scale, has never been possible before. In the beginning there was much difference of opinion as to what constituted a normal foot. Esthetics rather than common sense seemed to rule. Due to this many men were sent in by their draft boards who were unfit for full duty while some of the fit were disqualified. In practice it was found that only two conditions need be met for a foot to be considered normal in the army sense, *i. e.*, a foot on which a man could march and fight. The requirements are that there must be unrestricted motion of the foot joints and that the line of weight bearing must pass through the forefoot. Such considerations as height of arches are unimportant. Men accepted for the service on this basis had little foot trouble and if trouble did develop it responded to treatment in the great majority of cases. On the other hand men accepted in violation of these requirements, such as cases of flaccid flat feet with abduction and eversion, rigid or spastic flat feet, rigid arthritic or post traumatic feet, marked cavus, ankle valgus or varus following fracture, marked hallux valgus, hallux rigidus and amputations or severe derangements of the joints of the great toe, could only in a few instances be made fit for duty and in many cases were discharged from service.

The causes of foot trouble are of interest to the Army Surgeon principally with a view to their prevention. In general it was convenient to consider the causes of foot disability among young men of the draft age as due to three causes; congenital, traumatic and infectious.

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Of the minor abnormalities, trauma due to wearing improper shoes played the greatest part. Abnormalities due to congenital causes or to trauma prior to entering the service were beyond our control and unless the disability was slight, men with such disabilities were not accepted for full duty. With the men accepted for service it was found that much could be done to minimize the amount of foot trouble. Trouble resulting from trauma of improper shoes and overtaxing the feet could be prevented. Likewise much of the disability from infection could be controlled. The measures found useful in preventing foot trouble were proper shoes, correction of faulty attitudes of walking, use of "foot strengthening" exercises, prevention of overtaxing and elimination of infectious foci.

The shoe question for the soldier has been solved by the Munson shoe. This shoe possesses all the qualities desired for the average adult. The inner line is nearly straight. The heel is broad. The shank is stiff. The toe cap is wide. It gives the necessary support to the foot and at the same time allows development. Support for the adult foot, particularly in the early stages of military training is very desirable. This support is required on account of atrophy of the foot muscles which has resulted from the prolonged wearing of the short and narrow shoes of civilian life. The shoes must be properly fitted and at least a half inch space must be allowed in front of the great toe. The degree of foot development that has resulted among our soldiers from the use of properly fitted Munson shoes has proven a revelation to the surgeons.

The most frequently encountered faulty attitude of walking among soldiers is that of "toeing out." This attitude by throwing excessive weight on the weak inner border of the foot invites strain of the longitudinal arch. This danger is increased when heavy packs are carried. The remedy lies in teaching the importance of walking correctly, with the inner borders of the feet parallel. It has also been found that it is well to avoid excessive "toeing out" while standing. Strain can be prevented among those who are required to stand for long periods by frequent changes of attitude, standing with inner borders of the feet parallel, "toeing in" and turning over on the outer borders of the feet.

The use of four simple exercises has been found of great benefit in strengthening the foot muscles of soldiers in training. They must be given with the men wearing correctly fitting shoes so that the play necessary for muscle development may occur. The exercises require only a few minutes and can be given daily as part of the setting-up exercises. Each exercise is repeated about ten itmes. The exercises are:

(1) Rising on the outer borders of the feet.

In this exercise the men stand with their feet six inches apart and the inner borders parallel. The exercise is done on counts given by the officer or noncom in command. On the count 1 the men rise on the outer border of the feet and on 2 they come back to their standing position.

(2) Knee-twisting exercise.

In this exercise the position of the feet is the same as in the above. The feet remain fixed and the motion is a twisting outward of the thighs and knees which elevates the arches. The movement is accomplished entirely by the external rotators of thigh. It is likewise performed to two counts. On 1 the knees and thighs are twisted out and on 2 the men relax, allowing the knees to return to their original position.

(3) Toe exercises.

The position of the feet is the same. The exercise is done by first bending up or dorsiflexing the toes, bending down or plantar flexing the toes, separating the toes and then coming to rest. It is done to 4 counts: 1 toes up; 2 toes down; 3 separate; 4 rest.

(4) Rising on toes.

The men standing with feet parallel and six inches apart raise up on their toes as far as possible turning their heels out as they rise. They then descend gradually. They should not "flop down." This exercise is given in 2 counts: 1 up; 2 down.

Foot trouble from overtaxing the feet is likely to occur in changing occupations, from one requiring little use of the feet to one where much is required, as in the case of soldiers, or in starting to walk again after an illness or operation. Among our soldiers it was found that trouble could be avoided by increasing the foot work gradually. By drilling new recruits on a plan that provided for frequent rests and changes of instruction no time was lost and little foot disability resulted. The use of "foot strengthening" exercises was also beneficial. On the first sign of trouble strapping the arches and relieving the strain on the longitudinal arches by raising the inner border of the shoe was practiced. During convalescence following illness or operation it was found an excellent plan to strengthen the foot and leg muscles by massage and exercises before the patient began to walk. Walking was allowed only in high shoes. Too much emphasis cannot be laid on the dangers of slippers or loose hospital shoes. Such shoes give no support to the ligaments and muscles weakened by disease and non-use. Strapping and shoe alterations were made use of if there was any evidence of weakening of the longitudinal arch.

Infection operated in the causation of foot trouble in two ways. In some cases the organisms were actually present in the joints and soft tissues of the foot. The diagnosis in such cases was usually relatively simple. In the cases where the trouble resulted from focal infection the question was not always so simple. Many cases cleared up with the treatment of an old gonorrhoea, the removal of diseased tonsils or attention to the teeth. The possibility of focal infection should always be considered in treating foot cases.

The importance of considering other factors than actual foot abnormalities as causing or aggravating foot symptoms likewise needs emphasis. A general physical examination of soldiers complaining of foot trouble has revealed many interesting things. Among cases referred to the orthopedic surgeon complaining of foot trouble were found cases of neuro-circulatory asthema, early pulmonary tuberculosis, hyperthyroidism, anaemia, psychoneurosis, peripheral neuritis, varicose veins, thrombo-arteritis, obliterans, cardiac and nephritis conditions. As the relief of such patients cannot come from the treatment of a foot condition the surgeon must be constantly on the alert to detect and eliminate such cases.

It was found that success in treating foot disabilities in the Army was dependent upon accurate diagnosis, mechanical correction of abnormal positions and the strengthening of weakened foot structures. The part played by focal infection has already been emphasized. The correction of foot deformities of recruits by operation has been almost entirely abandoned. The reasons for this is that experience has shown that a strong marching foot cannot be obtained in a reasonable time by operative procedures. Much better results have been obtained by conservative measures. The use of adhesive plaster, felt and simple orthopedic alterations of the Munson shoe is sufficient to mechanically correct any case that is worth retaining in the service. The importance of strengthening weakened foot structures has not received the attention it deserves. The simple mechanical correction of a defect does not cure the condition. Stretched structures tend to regain their normal condition when relieved of strain by a correct appliance but unless the muscles are strengthened so that they can stand the strain, removal of the appliance is followed by a recurrence of the original condition. We should aim in the treatment of static deformities of the foot to place the weight bearing where it belongs by mechanical means and then educate the muscles to maintain it, so that mechanical aids can be dispensed with.

The mechanical correction of static foot deformities is an interesting and instructive problem. The use of some mechanical means to correct a static defect such as a weak longitudinal arch seems like a logical procedure and in practice has been followed by good results. By such means weakened structures are relieved of abnormal strain, weight bearing can be transferred to stronger parts and the individual can be allowed about without danger of aggravating his condition. In civil life plates, felt pads and shoe alterations have been used as mechanical means to accomplish this end. In military service plates are impractical. They are expensive. They splint the foot and thus prevent development of the muscles. They also create a sense of dependency that is difficult to overcome. Felt supporters placed in the shoes are open to the same objections and when strapped on the feet are dirty and render satisfactory use of the foot exercises impossible. Orthopedic shoe alterations have been found the only practical method under Army conditions. In the opinion of the writer properly made shoe alterations have been a great aid to treatment. For longitudinal arch trouble, simple inside leather wedges have been found entirely satisfactory. The wedges are inserted between the layers of sole and heel of the Munson shoe. The thickness of the wedges vary from ⅛ to ¼ of an inch depending on the case. Extending the heel or reinforcement of the shank of the Munson shoe was found unnecessary. It is believed that failure to obtain results from shoe alterations has been due to the use of improper shoes, failure to adopt the height of the wedge to individual requirements, failure to properly carry out treatment or to improperly made alterations. In reference to the last attention is particularly called to alterations nailed on the outside of the shoe. Such alterations in addition to being unsightly wear down rapidly and a uniform correction is not maintained.

Orthopedic shoe alterations have given satisfactory results in other conditions. For affections of the anterior arch the anterior wedge has been used. The wedge has been inserted between the layers of the sole in such a position as to transfer the weight bearing from the heads to the shafts of the metatarsal bones. For successful results it has been found necessary to determine the proper position of the wedge by inserting it with the patient present and altering the location until relief of the symptoms has been obtained. A modification of the anterior wedge has been made use of in cavus cases. A broader wedge, placed further back, has been used, similarly inserted, so that weight bearing was evenly distributed along the outer border of the foot. Cases of short heel tendon were treated by raising the heel of the shoe.

Measures to strengthen the weakened foot structures were commenced as soon as shoe alterations had been made. Graduated foot exercises were the most important means of accomplishing this end, but massage and contrast baths were made use of when possible. The foot exercises were ordered for cases of poor development of the foot muscles, subacute and chronic flat feet, ankle valgus, cavus and the affections of the anterior arch. In acute foot strain they were not used until the acute symptoms had subsided. For the treatment of rigid or spastic flat feet preliminary treatment to convert the condition into a simple flat foot is required. While certain exercises are usually considered indicated for strengthening the muscles that support the longitudinal arch and others for those that support the anterior arch, in practice it has been found that usually all muscles are weak. The patient therefore profits by exercises that strengthen all the muscles and the same exercises are given for all the conditions mentioned. In cavus the exercises have been found beneficial by increasing the bearing surface of the foot through development of the plantar muscles.

The exercises employed are both active and passive. Some are given with the patient seated and some standing. A system for giving these exercises which proved very satisfactory consisted of a six weeks training course divided into three parts of two weeks each. During the first two weeks there were two drill periods daily. Starting with ten minutes these periods were gradually increased to thirty minutes each. Active and passive exercises with the men seated were employed. During the second two weeks the two thirty-minute periods were employed. Exercises given with the men standing were added to those of the first two weeks. During the last two weeks one drill period of thirty minutes was employed. The other drill period was replaced by graduated walks. Experience has shown that if results are to be obtained certain things must be insisted upon. The corrected shoes must be worn at all times that the patient is about with the exception of the drill periods. Attention must be concentrated on the foot exercises. Other exercises, particularly those given with the patient standing should be avoided. The exercises must not be overdone. Frequent rest periods during drills and walks must be allowed. At rest periods men should be allowed to sit down. The scheme followed is indicated below.

Exercises for the first two weeks:

The exercises during this period it will be remembered are given with the patient seated. The feet are bare.

(1) Rising on the outer borders of the feet.

In this exercise the feet are firmly planted on the floor and are about six inches apart. The exercise is done by rising on the outer borders of the feet and then coming back to the resting position. This exercise should call into play the adductors of the foot only. Turning the entire lower limb out from the hip must be guarded against. This exercise can be conveniently given to the counts 1 up and 2 down.

(2) Toe exercise.

With the feet in the same position as in the previous exercise the toes are flexed and then extended. 2 counts are used for this exercise also. 1 toes up; 2 toes down.

(3) Toe spreading exercise.

The position of the feet is the same. The toes are alternately spread and approximated. At first it is often necessary to assist the muscles in separating the toes with the hands. The exercise is done to 2 counts. 1 toes apart; 2 toes together.

(4) Anterior arch exercise.

This is a passive exercise of the fore foot designed to develop the muscles of this region, improve the range of motion of the joints and increase the convexity of the anterior arch. The exercise is given with the patient seated on a bench or a low table. The legs are crossed. The fore foot is grasped by the hand, fingers over the dorsum of the toes and the thumb under the anterior arch. The left foot is manipulated by the right hand and visa versa. The exercise is performed by pushing the toes down with the fingers while at the same time the thumb pushes up the center of the anterior arch. It is done to 2 counts. 1 toes down, arch up. 2 rest.

(5) Longitudinal arch exercise.

This is a passive exercise designed to adduct and invert the foot and increase the arch. The patient is seated with legs crossed and the left foot is manipulated by the right hand and visa versa. In this exercise the thumb rests under the scaphoid at the height of the arch while the fingers and palm of the hand rest on the dorsum and outer border of the tarsus. In this exercise the foot is adducted and inverted while the keystone of the arch is pushed up by a twisting motion of the hand. The exercise is done in 2 counts. 1 twist; 2 rest.

Exercises for the second two weeks:

(6) Rising on the outer borders of the feet.

This exercise corresponds to exercise 1 except that the patient is standing. He rises on the outer border of his feet and descends. The exercise is done in 2 counts. 1 up; 2 down.

(7) Knee-twisting exercise.

The feet are kept fixed on the floor with the inner borders parallel and about 6 inches apart. With a twisting motion accomplished by the external rotators of the thigh, the thighs and knees are turned out and the arches of the feet are elevated. It is done to 2 counts. 1 knees out; 2 rest.

(8) Pigeon toe walk.

This exercise is accomplished by successive steps. The patient walks a crack or chalk line. At each step the leg is straightened out and the foot extended. The counts for this exercise are 1, 2, 3, 4, etc., a count being given for each step.

(9) Walking on the outer borders of the feet.

In this exercise successive steps are taken holding the inner border of the feet off the floor. A count is given for each step. 1, 2, 3, 4, etc.

During this period exercises 1, 2, 3, 4, and 5 are continued and the above are added.

Exercises for the last two weeks period.

(10) Rising on toes.

Standing with feet parallel six inches apart, this exercise is accomplished by rising on the toes as far as possible and then descending slowly. The heels are turned out as the patient rises. The exercise is done in 2 counts. 1 up; 2 down.

There is only one period of drill during the last two weeks. The second period is replaced by a series of graduated walks, beginning with a mile and increasing to eight miles. During these walks the men are closely supervised and all faulty attitudes of walking corrected.

The ten exercises described above have been found to be all that are required. The exercises may be repeated as many times as may be desired at a sitting. While at rest during drill periods the men are taught to massage their feet by stroking in the direction of the venous circulation, by kneading the muscles and by manipulation of the joints. By systematizing the exercises and giving them to counts considerable numbers of men can be handled efficiently at one time. The advantages that might be claimed for this method of treating a foot case are that it is simple, requires no apparatus, requires a minimum of trained attendants and can be given to fifty as easily as to one patient.

Conclusions.—From the experience gained in dealing with large numbers of men in the Army camps, the following conclusions may be drawn:

(1) A foot may be considered normal when there is unrestricted joint motion and the line of weight bearing passes through the fore foot.

(2) Foot trouble can be prevented by wearing proper shoes, by correcting faulty attitudes, by care to prevent overtaxing, by eliminating focal infections and by the use of exercises to strengthen the foot muscles.

(3) Symptoms referred to the feet are encountered in many conditions.

(4) The cure of static foot defects is dependent upon muscle training. Mechanical correction by plates or shoe alterations is to be regarded only as an aid to treatment.

MEDICAL HISTORY OF GENERAL SCOTT'S CAMPAIGN TO THE CITY OF MEXICO IN 1847

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(With 5 illustrations)

Introduction.—The war between this country and Mexico began in May, 1846, with the occupation by the United States of the disputed territory between the Neuces and the Rio Grande. Mexican troops having also been sent to occupy this territory, armed encounters occurred and war was declared on May 13. General Taylor's small army of occupation soon cleared Texas of all armed Mexicans, carrying the war into the enemy's undisputed territory across the Rio Grande, captured Monterey and occupied three of the northern states of Mexico. In what is now New Mexico and California the Mexican authorities were driven out and American governments instituted. Yet no decisive results were achieved; the Mexican government still maintained the contest. Later in the year, attacks on the limbs and outer members having failed to impose the will of this Nation on Mexico it was resolved to strike at the heart of the country, at the capital city. To quote the words of President Polk's Message of December, 1847:

> It was quite evident that if the conquest of California and New Mexico, and our military occupation of the important states of Tamaulipas, Nueva Leon and Coahuila would not dispose the enemy to accept reasonable terms of accommodation, it would be necessary to direct our future operations against more vital points of the Mexican Republic.

The civil and military authorities of the time appear to have entertained no doubts as to the success of any expedition they might undertake against the city of Mexico; the only question was as to the shortest and best line of operations. This was easily seen to be the line from Vera Cruz. From that point on the coast to the capital, a distance of 260 miles, a fairly good road, the *Camino Nationale*, was available. An excellent road when constructed, like many things Mexican and Spanish it had been allowed to fall into some decay; yet, though rough in places, it was a substantial road for all military purposes.

Plan of Campaign.—The plan decided upon was to mobilize a new army somewhere near Tampico, capture Vera Cruz, and with this point as a base, advance along the national road to the capital. The whole undertaking appears to have been planned and entered upon with the certainty of an ordinary maneuver campaign, with a cocksureness which events proved misplaced; for although Scott's little army was ever victorious, there were times when it had to halt for weeks and months, and other times when it appeared not far from destruction.

The command of the expedition was entrusted to Maj. Gen. Winfield Scott, a veteran of 1812 and an officer of marked energy and ability. To him was given practically the entire Regular Army of the nation and a division of volunteers. The regular regiments, with General Taylor near Saltillo, were marched to the coast and embarked on transports. The volunteers were assembled from the border and from New Orleans; all were at Lobos Island early in February, 1847. Since the United States Navy controlled the entire coast, troops could be landed at any desired point.

General Scott's regular division contained the eight regiments of infantry then existing; the four regiments of artillery, serving as infantry; two light batteries; the regiment of mounted rifles; parts of the two regiments of dragoons, and a company of engineers. The volunteer division consisted of ten regiments of infantry and a small regiment of cavalry. Unfortunately, most of these regiments were enlisted for but twelve months and had but two or three months yet to serve; but the South Carolina, New York and Pennsylvania (two) regiments had been enlisted later and for "the period of the war." When General Scott's army has been assembled there were left with General Taylor but four companies of regular dragoons and three regular field batteries, and in the whole United States but six companies of regular troops.

The troops reached Lobos Island (60 miles south of Tampico) early in February and remained there several months. A case of smallpox having developed in one of the Pennsylvania regiments, the men were landed on the island so as to give opportunity for ventilating and fumigating the ship. The remaining troops were also landed and given exercise and drills. When the transports sailed, three companies of the Second Pennsylvania, thought to be infected, were left on the island and did not join again until the army was at Jalapa.

The Medical Department.—At this time the Medical Department of the Army consisted of one surgeon general (colonel), four purveyors (lieutenant colonels), sixteen surgeons (majors) and fifty-one assistant surgeons; total seventy-one. The strength of the Army at the beginning of the war was about 7,500 men. The Act of May 13, 1846, calling out 50,000 volunteers, provided for one surgeon and one assistant for each regiment, but made no increase in the regular Medical Corps. On February 11, 1847, preparatory to the greater undertaking, Congress increased the Regular Army by one regiment of dragoons, one of voltigeurs and eight of infantry. This act authorized one surgeon and *two* assistants for each regiment, and further increased the corps by two surgeons and twelve assistants; in this way bringing it up to 115 medical officers, which was the strength of the Medical Department during the remainder of the war. The Act provided that the additional officers should be discharged at the end of the war, but this was never done. Under this law, for the first time, medical officers were given definite rank and status. The new officers were commissioned after examination, a procedure in use since 1832. There is little doubt that the medical officers of the new regiments were superior to the line officers, who were chosen almost entirely for political reasons. Of four hundred, only six had been in the Regular Army previously. As the Volunteer Act had provided 135 volunteer surgeons, there were then about 250 medical officers for an army of approximately 50,000 men; a proportion of five per thousand.

Although in 1847 the conflict had been in progress for almost a year, the Medical Department was not at all organized for war. It had been planned to meet peace conditions only, small and independent commands, and so remained throughout the war. When the Army was mobilized and moved to Vera Cruz the only medical officers with it were those assigned to regiments, not more than one to each regiment of about five hundred men. In his December Message President Polk stated that one of the causes of suffering among the sick and wounded was that medical officers had to be taken from the regiments to serve the hospitals and, as we shall see, that was the case throughout the campaign. At Vera Cruz, Jalapa and elsewhere no division hospitals were thought of. When the regimental hospitals overflowed, so-called general hospitals were established in buildings. For these there was almost no provision, either in personnel or material. Hospital furniture, clothing, bedding, even cooking utensils were lacking. In thus depending on regimental hospitals the system of the British Army was followed; and it is remarkable that no one saw its defects. On the contrary, Tripler clung to the regimental hospital and, when in 1861 made Medical Director of the Army of the Potomac, tried to again force its use.

For transporting the wounded there was little or no provision. Otis states that no ambulances were used during the war. The first ambulances appeared in the United States about 1859. With the aid of details the surgeon collected the wounded. Having notified the Quartermaster of the number to be transported, he considered his duty completed. The Army Regulations of 1858 provided:

> For the accommodation of the sick and disabled a wagon will be attached to the rearguard, when necessary and practicable, and a surgeon will attend to give assistance and to see that no improper persons are suffered to avail themselves of the accommodations.

There was no hospital corps; stewards, wardmasters, nurses and cooks could be detailed from the Line, and when so detailed received a slight extra compensation. These details were generally temporary and often of the worst material. Usually there was such urgent need for men for battle that few or no able-bodied men could be spared for the service of the hospitals; and at times the surgeons were obliged to organize their entire personnel *from the patients.* When it is remembered that in addition to all these difficulties, the surgeons of the Mexican War had four times as much sickness to deal with as those of the Spanish War some slight idea of their task may be formed. In 1898 the death rate from disease was about 25; in 1846 and 1847 it was well over 100. Although these surgeons had to deal with typhoid, typhus, malaria and yellow fever, the principal and most fatal disease was dysentery. For those who care to read a first-hand account of these campaigns, by a medical officer who took part in them, the Memoirs of Surgeon John B. Porter, U. S. A., published in *The Journal of the Medical Sciences,* 1848–52, are recommended.

The surgery of 1847 was that of the Napoleonic Era. Larrey and Des Gennettes in the French Army and Guthrie and McGrigor in the British Army had brought military surgery to an advanced state compared with what it had been before; but the wars of Napoleon had been followed by a long period of peace and little or no further advance in surgery had been made. Antisepsis was, of course, unknown. The surgeon went from bed to bed, cleaning (?) all wounds with the same sponge, and infection was expected as a matter of course. The mortality of the wounded was 12 to 15 per cent as compared with 4 to 5 today. Amputation was still the most important operation, but the surgeons of the Mexican War do not appear to have lopped off limbs with the abandon of Larrey and some of those of our Civil War. One important surgical invention had been made since Larrey's time—anaesthesia. Ether was first used on October 16, 1846, in the Massachusetts General Hospital. That the Army surgeons at Vera Cruz were using it early in 1847 shows their progressive professional attitude.

For supplying the armies in Mexico a purveyor's depot had been early established at New Orleans. In a report dated November, 1847, the Surgeon General said:

> Medical and hospital supplies in ample quantities and of the best quality have been forwarded to the various depots, for the use of the Army in Mexico; and to provide against emergencies, as well as to furnish the necessary medical supplies to the troops embarking at New Orleans for the seat of war, an additional purveying depot has been established in that city. It is with regret I have to relate that a transport conveying a very large and general supply of medicines, instruments, hospital stores, bedding, etc., to Vera Cruz, was wrecked on the 17th ult., and the supplies on board were consequently lost.

The total expenditures for medicines, instruments, hospital stores, bedding, etc., for the year ending June 30, 1847, were $98,458.83. An army of more than 100,000 was then being raised. New Orleans was the principal port of embarkation for the war. What might be called base hospitals were established there and at Baton Rouge, the barracks at those places being converted into wards and extended as needed.

There is ample evidence that General Scott had a lively realization of the gravity of yellow fever in the low country about Vera Cruz, even more than had the leaders of a similar expedition some fifty years later. He urged on the assembling of troops and their quick transport to Vera Cruz in order to forestall the appearance of the fever, which, as a rule, was due in May. Once the Army was landed he took the risks of moving to the attack without waiting for his heavy artillery, in order to forestall the fever. And when the city surrendered, although almost destitute of transportation, he hurried on to the highlands of the interior, in order to escape the fever which had already appeared in the vicinity. The fear of the terrible *vomito* seems never to have been absent from his mind until he had reached the tablelands, and it was a cause of more anxiety than was the Mexican Army. When, later, Brigadier General Franklin Pierce, in the midst of a prevailing epidemic, landed his brigade he was ordered to camp his men outside the town and to march at once. Thus the disease was escaped.

It is also evident that the Medical Department was not entirely ignored by the General, as was sometimes the case then and later. Colonel Hitchcock wrote in his diary at Jalapa: "The general is much in the habit of assembling in the evening the heads of the general staff departments . . . and talking of public business until 11 or 12 . . . inquiring into supplies, health, etc., etc." And again on the eve of the battle of Molino del Rey, he says: "The general had them in, consulting as to trains, depot for the sick, etc., etc." There are many orders and directions regarding the health of the command and disposition of the sick and wounded, some of which will be quoted later. Official reports quite generally mentioned the excellent work of the medical officers.

As the entire Regular Army was now on the way to Vera Cruz and the city of Mexico, it will not be wondered at that the Surgeon General accompanied it. In December, 1846, Surgeon General Thomas Lawson left Washington for the seat of war. When he arrived on the Rio Grande he was invited by General Scott to accompany him on his proposed campaign as Chief Medical Officer of the Army. The invitation was accepted and the Surgeon General accompanied the Army to the city of Mexico, but his position was rather nominal and honorary. Surgeon B. F. Harney appears to have acted as Chief Surgeon during the first part of the march and Surgeon R. S. Satterlee after the Army left Puebla. During the absence of the Surgeon General from Washington Surgeon Henry J. Heiskell took his place. The presence of the Surgeon General in the field appears to have had some good results, for on his return to the Capital he recommended two important measures which were approved by General Scott and soon afterwards adopted by Congress. One of these was a retired list for officers; the other was an asylum for enlisted men. General Scott collected various contributions in Mexico, from which after making all necessary military expenditures he had remaining the sum of $118,000. In accordance with his wishes this was used in founding the Soldiers' Home in Washington. It may be mentioned here that the Surgeon General had only the rank of colonel. At the end of the war he received the brevet of brigadier, but the full rank of that grade was not accorded until the Civil War. Surgeon General Lawson had had service in the Line as well as in the Medical Department, having been a lieutenant colonel of volunteers in the Florida Indian War of 1837.

Vera Cruz.—The army under General Scott, consisting of 13,470 officers and men, landed on the beach near Vera Cruz during March 9 to 11, 1847. Some light guns were put ashore, also some heavy guns from the fleet, which took an active part in the siege, and the bombardment was begun on March 22. General Scott was already some weeks behind the schedule which he had planned, and he pushed the work in every possible way. To a meeting of his staff he said, "We, of course, gentlemen, must take the city and castle before the return of the *vomito.*" The city and castle were poorly prepared for defense, and suffered severely during the bombardment. Although warned, the citizens had chosen to remain and now suffered the consequences. Their houses were tumbled about their heads and both citizens and soldiers were killed in numbers. On March 29 the place capitulated, the garrison being paroled and allowed to depart. The American loss was slight: 19 killed and 51 wounded, of whom three died. Seven of the Navy landing party were killed and eight wounded. The Mexicans reported 400 killed and 600 wounded, of a garrison numbering four or five thousand.

During the siege the wounded were treated in the regimental tents by their own surgeons. The facilities were poor and the three deaths recorded were probably only those occurring before transfer to a general hospital. Surgeon John B. Porter says:

> We landed on the beach near Vera Cruz, nearly opposite the Island of Sacrificios, and took possession of the sand hills in front. Vera Cruz is in the low country, *tierra caliente,* latitude 19 degrees 11 minutes north; a walled town about one-half

by one mile in extent. Back of the town are swamps, supposed by Prescott and others to be the principal cause of the insanitation of the place. In 1847, under the most unfavorable conditions of war and siege, with wretched police, Vera Cruz was much less affected by malignant yellow fever than New Orleans. The population is about 5,000 and the rainfall 125 to 200 inches per annum. The principal diseases are: diarrhoea and dysentery, tropical fevers, especially *vomito prieto*—yellow fever is the principal disease of the town.

What Prescott said of the place is still interesting and curious:

> The place was surrounded by stagnant marshes, the exhalations from which, quickened by heat into the pestilential malaria, have occasioned in later years greater mortality to Europeans than all the hurricanes on the coast.

He maintained vigorously that there were no epidemics of yellow fever on the coast before the coming of the Spaniards, but that as soon as they founded a congregated colony the disease appeared.

The "English Soldier" (Valentine) says:

> The supply of water during the siege was scanty and only secured by digging holes in the sand to the depth of four or five feet and then waiting until a muddy-looking fluid oozed up to a depth sufficient for dipping a cup.

It is not to be wondered at that with soldiers drinking water from such holes, in a camp where sanitation was doubtless poor, diarrhoea and dysentery soon appeared. Surgeon J. J. B. Wright said in a later report:

> It is a subject matter of history that while this country was in the possession of Spain, the permanent government, in order to secure a garrison of acclimated soldiers for Vera Cruz of 3,000 men, deemed it necessary to send 20,000, calculating within a fraction of the entire decimation of the force by the diseases of the station. That acclimated force was never transferred, but remained the permanent garrison of the post. If 17 out of 20 able-bodied men from a southern climate died in the process of acclimatization in this city, what but almost inevitable death can be expected when invalids from our northern latitudes are detained here in the summer season?

This last is part of a protest against the regiments bringing their sick along with them from New Orleans. He goes on to say:

> Every old resident of Vera Cruz knows full well that the Mexican Government utterly failed to keep anything like an adequate garrison in the city—if it was not indeed by death, the reputation of the place for terrible mortality induced so frequent desertions that the barracks were almost deserted.

No further proof is needed that Vera Cruz was at that time an extremely unhealthful place; but the season for malaria and *vomito* was not yet on when General Scott's army landed.

The Mexican troops marched out of the city on March 29 and the Americans marched in. A letter from an officer of the U. S. S. *Princeton* said of the entry:

> The sight in the plaza when General Scott took possession would doubtless have been very handsome if the soldiers had been dressed as our holiday soldiers in Philadelphia; such a set of dirty, ragged-looking devils is hard to see.

The men, living in the trenches for two weeks, could not have been neat and smartly dressed; but it seems that from all accounts they rather gloried in a rough and wild appearance. The army at Vera Cruz was nearly one-half volunteers, who had already begun to show their independence of action and disdain for appearances. The regulars were also, as General Scott said, "very largely diluted with recruits," and the ideal soldier seems to have been what, in the slang of today, we term a "roughneck."

The City and Surroundings.—The country about Vera Cruz was sickly and uninteresting. The low country back of the city abounded in sandhills and was destitute of water. The volunteers complained loud and often of the lack of water and vegetation. They grumbled that Mexico, which had been pictured to them as a land of luxuriant vegetation, abounding in luscious tropical fruits, should be a sandy desert without so much as drinking water; where they were obliged to subsist on salt pork and hardtack. They had other and more substantial grievances, for they were practically without tents and their clothing was already almost worn out. Diarrhoea and dysentery spread at an alarming rate, and these diseases were the principal factors in high disease and death rates during the entire campaign. Even yellow fever, when it later appeared, was a lesser evil.

The city itself was in a wretched state following the siege. Lieutenant Stevens (later General Isaac Stevens, killed at Chantilly, September, 1862), said of it: "Vera Cruz is a miserable, dirty place; the streets are full of filth." And again, "The filth and nastiness are almost beyond belief; our authorities are now making every effort to clean the city." Colonel Hitchcock wrote in his diary on March 31: "Have moved my tent to the suburbs, in preference to being in the city, which is very offensive and must soon become sickly. The stench is intolerable in some quarters." Colonel Hitchcock was Inspector General of the Army.

The General Hospital.—Immediately after the surrender of the city a general hospital was established in the old Franciscan convent of San Carlos, near the gate leading to the mole. The building consisted of a very large church, a smaller chapel, and numerous upper rooms around the convent patio; a convenient pile of buildings, facing the sea, well ventilated, and having a good water supply. Surgeon John B. Porter, U. S. Army, was placed in charge of this place, called by courtesy a hospital. Since the word hospital primarily means a shelter, it could be called that; but it afforded little more than shelter. What Surgeon Porter had to contend with in making the place a real hospital may be learned from his diary:

> To organize the hospital was no small undertaking; there was not a single steward except invalids and incompetent ones; an invalid wardmaster; no well men left for

cooks and nurses, when the army marched away. There was not a single kitchen table, bench, bunk, privy, chamber utensil; in a word, there was nothing but the miserable sick, and under these circumstances the machine had to be put in motion *Hoc labor, hic opus est.*

This was to be not only the permanent hospital for the garrison left at Vera Cruz; it must receive all the sick sloughed off by the marching divisions and must serve in some degree for a base hospital for the entire expedition. While it received few from the front. it took many over from the organizations going forward. As to equipment, it had nothing except medicines and surgical supplies. Personnel there was none. The buildings were crowded full of sick and the surgeon left to organize his force from the patients, who in those days were classified as "sick" and "convalescents;" the latter being chiefly such diarrhoea patients as could walk about. Conditions were bettered later, but at the beginning they were like the so-called hospitals of Napoleon's Russian campaign.

On April 7 Surgeon Porter took charge of the hospital. General Twigg's Division was to march the same day, and sent in all its sick. Bales of blankets from the Quartermaster stores were opened and distributed, and boiled rice given out as food. On April 9 all the sick from Patterson's Volunteer Division were received, principally dysentery patients. By April 12 the hospital was filled with the sick; on the 13th, Worth's Division marched and the whole of his sick had to be provided for. On the 17 the last of the army marched away, Quitman's brigade of volunteers. To provide for the sick of these last organizations it was necessary to take possession of the Mexican military hospital, which had but a few patients.

Yellow Fever.—On April 17 Porter wrote, "Hospital getting in better shape." From that time on the rush was not so great, but more or less sick—chiefly dysentery cases—were admitted daily. Yellow fever did not appear early as might have been expected, considering the hot weather, the native population and the camp following of unruly teamsters and laborers. On May 4 several cases of "congestive fever" were seen among the laborers of the Quartermaster Department; "Irishmen and very dissipated." From the 1st of May malignant fevers may be said to have prevailed, generally very severe and rapidly fatal. These hired laborers were exposed to sun and rain, had money to spend, were very dissipated, less under discipline, and when sick did not report for two or three days. (I quote from Porter.) By May 7 the weather was very warm. On that day the first soldier died of the *vomito;* a volunteer who was very sick when brought to the hospital, in fact, unconscious and moribund. Other cases followed. Yet the disease was neither very widespread nor very fatal, as will be seen from the following figurers, giving data for the entire season:

Regular troops	187 cases;	50 deaths
Volunteers	73 "	25 "
Q. M. employees	152 "	41 "
Totals	412 cases,	116 deaths

The case mortality was 28 per cent; not high for the place and circumstances. Porter says that one cause of the mortality was poor physicians. At first he had a few assistants, but after the battle of Cerro Gardo (April 18) every military surgeon at Vera Cruz, except Porter and Medical Purveyor Laub, was ordered forward to assist with the wounded at Jalapa. Physicians had to be hired on the spot and they were in the nature of beachcombers. Later, some more competent ones were secured, but in the beginning there were none but sick men, who came in daily by scores and hundreds. Moribund patients also came in numbers, until it sometimes seemed that they were sent to the hospital merely to die. The stand-by in the treatment of the *vomito* was quinine. It is remarkable that Porter maintained most emphatically that the disease was not contagious. After handling five hundred cases he declared that he had never seen one case contracted from another.

The hospital at Vera Cruz, during the year from April 1, 1847, to March 21, 1848, received 6466 patients, of whom 775 died. The percentage of deaths was twelve. While this seems high to an age when case mortality is but three or four per cent, it was not at all high for that day. When we consider the latitude, climate and the presence of yellow fever, as well as the ignorance concerning causes of fever, dysenteries, etc., we must admit that it was very moderate. In the Crimea a few years later the case mortality ranged from 15 to 20 per cent in the British Army, and from 25 to 30 in the French.

A muster roll for the hospital on June 30, 1847, showed that since April 30 there had been on duty: eleven stewards, one wardmaster, two cooks, four attendants and four matrons (Mexican). Only eight of these remained on the latter date. On August 31 there were: twelve stewards, one cook and six attendants.

As to surgery, Porter wrote:

> Gunshot wounds were not very successfully treated at Vera Cruz. The air was bad and the city unhealthy. But I have often thought that the effects of the inhalation of ether, in those cases in which it was used, was as injurious as any other malign influence whatever. We had occasion to perform many operations at Vera Cruz in 1847 and our experience with sulphuric ether was sufficient; and I do not hesitate to say that my conclusions were opposed to its further employment. By the inhalation of ether in the most cautious manner, in sufficient quantities to produce insensibility to pain, the blood is poisoned, the nervous influence and muscular contractibility destroyed or diminished, and the wound is put in an unfavorable state for recovery. At the close of the war I have decided never to use it again.

Unyielding conservatism and prejudice blinded Porter to the value of the one great surgical discovery of his day. And in studying the medical history of this war one is unavoidably impressed by the ultra-conservatism of all the leading medical officers. Their motto seemed to be, Whatever is, is right.

To avoid the deadly fever as well as for military reasons General Scott had planned, after capturing the city, to move at once toward the interior; but the army could not move without transportation, and transportation was not at hand. When the troops landed at Vera Cruz many of the required wagons were still in the United States and mules were yet to be purchased. General Scott estimated that for the march he would need 800 to 1,000 wagons and from 2,000 to 3,000 packmules. He said this would provide for the troops and supply trains, "leaving many wagons for the transportation of the sick to the next depot." But on April 5th only 180 wagons with teams were at hand. Nevertheless he resolved to start, leaving part of the volunteers behind to await other wagons which were on the way. He had private information that some cases of yellow fever had already appeared in the vicinity and he would delay no longer. The start was ordered for April 7th. The order of march provided some slight assistance for such sick as might fall out on the road.

G. O. 94, HQrs. of the Army, Vera Cruz, April 6, 1847.

Extract: The respective chiefs of the general staff will assign to the headquarters of each marching division: one engineer, a topographical engineer, an ordnance officer, a quartermaster, an assistant commissary, and a medical officer. . . . One wagon will be assigned to the Medical Director of the Division, for extra medicines and hospital stores.

Excepting the regimental stores, this one wagonload seems to have been the only medical supplies for a division of about 3,500 men.

ORGANIZATION OF THE ARMY, APRIL 7, 1847.

First Division, Regulars, Bvt. Maj. Gen. William J. Worth
- Light Battery A, 2d Artillery
- 2d Artillery, 8 companies as infantry
- 3d Artillery, 4 companies as infantry
- 4th Infantry, 6 companies
- 5th Infantry, 6 companies
- 6th Infantry, 5 companies
- 8th Infantry, 7 companies

Second Division, Regulars, Brig. Gen. David E. Twiggs
- Light Battery K, 1st Artillery
- Howitzer and Rocket Company
- Mounted Rifle Regiment, 9 companies, dismounted
- 1st Artillery, as infantry
- 4th Artillery, 6 companies, as infantry
- 2d Infantry, 9 companies

3d Infantry, 6 companies
7th Infantry, 6 companies

Third Division, Volunteers, Maj. Gen. Patterson
3d and 4th Illinois
New York Regiment, 10 companies
1st and 2d Tennessee
Kentucky Regiment
1st and 2d Pennsylvania
South Carolina Regiment, 11 companies
Detachment of mounted Tennessee volunteers

Unassigned
One company of Engineers
One company of Ordnance
Six companies of Dragoons

The March and Battle of Cerro Gordo.—After the capture of Vera Cruz the army was reorganized into three divisions. The former regular brigades became divisions, each with two small brigades of three regiments each. These brigades were little larger than a modern regiment, containing some 1,500 men each. General Patterson's Volunteer Division contained ten regiments, in three brigades under Generals Shields, Pillow and Quitman; all political generals. This small army was well organized and disciplined, making some allowance for the volunteers as to discipline. But it was gravely lacking in transportation of all kinds, having come to Vera Cruz with practically none. By almost superhuman efforts Colonel Harney had managed to obtain mounts for about 500 dragoons, and the two batteries were horsed. But when the start was made the regular divisions had but forty-five wagons each, and the division of volunteers, some 4,000 strong, had but fifty-five. The result was that officers' baggage, tents, supplies, everything except ammunition and rations had to be left behind. The marching order read: "Not more than three common tents, principally for arms and the sick, can be allowed to the officers and men of each company." One may imagine how many tents the men could use. Shelter tents were then unknown. The men were obliged to bivouac, exposed to all kinds of weather and to the violent changes common to that region. When halting for a few days they made shelters of cane and boughs, as the men of Cortez had done before them.

The March.—The "English Soldier" says of the departure from Vera Cruz.

> A great number of sick were left behind, few of whom ever joined again as most of these poor fellows soon fell victims to the unwholesome climate and the careless treatment soldiers receive in overcrowded hospitals during campaigns.

It will be noticed that this man, himself a former British soldier, looked on poor hospitals and neglect of the sick of an army as things inseparable from war, which at that time was generally the case. He continues:

> A great many of the men, myself among the number, were ill with diarrhoea; but being of the opinion that small chance of renewed health awaited those who stayed behind in the hospitals of Vera Cruz, we were all glad to get away from it; trusting for a renewal of our exhausted vigor to the pure air of the mountains, which a few days' march would enable us to reach. When we reached the camp (first night) for the night, about five miles from Sante Fé, the rear of the column was several miles long.

This was Twiggs' Division of Regulars; the volunteers straggled still more.

Failure to provide transportation, tents, suitable food and extra clothing were among the causes of the excessive sickness from which our army suffered during the campaign. The supply of food was scanty during the early part of the march. Clothing was insufficient among the volunteers. At that time they were not issued clothing as were the regulars, but its value was commuted. They had purchased poor and unsuitable uniforms to begin with and had brought along no reserve supply. They were now almost naked, or clad in nondescript garments found in the country. That their clothing was worn out was one of the reasons given for not reënlisting later. Poor water, rations of hard bread and bacon, lack of shelter and insufficient clothing caused sickness, and when food was found in the country it only aggravated the prevailing dysentery.

But in spite of all difficulties the Army took up the march on April 7, and on April 17 the last brigade left Vera Cruz. Before it stretched the great National Road, *El Camino Nationale*, leading on two hundred and sixty miles to the capital of Mexico, the city of the Montezumas; and there was scarcely a soldier in the entire Army so ignorant that he did not know how, three centuries before, Cortez and his valiant little band had marched that same highway to riches and everlasting fame. The desire for adventure, the romance present in some degree in every soldier, here had abundant scope for realization. Every letter sent home spoke of anticipated revels in the halls of the Montezumas, and the march was entered on with light hearts and confident spirits. With no less joy and wonder than the Spaniards had experienced, the American soldiers ascended the beautiful slopes leading towards the garden lands of Jalapa. As these soldiers of the 19th century moved slowly along in the column of march it required little effort of the imagination for them to conjure up the scenes of old and to regard themselves as anachronistic conquistadores, postdated three centuries, each man an Ovando or perhaps an Alvarado. And there were not wanting those to take the place of chroniclers like old Bernal Diaz, as the crop of later inquiries and courts martial painfully testify. Every step of the road felt the tread of the blue-clad American soldiery, as it had felt the steps of Hernando and his mailed 16th century warriors. Even General Scott partook of the common feeling, and his orders and reports display a statelier diction than is common to such papers; as though prepared not so much for that time as for future generations of readers. But, alas! many of these romantic and chivalric dreams were to be rudely shattered.

Though excellently constructed, the road had fallen into decay in places, making it rough for animals and destructive to wagons; but on the whole it was a substantial military road, with excellent stone bridges which the enemy had not destroyed. At first, in the *tierra caliente*, it led through hills and deep sand, where there were many stragglers from sore feet, fatigue, heat and diarrhoea. A writer says that when Patterson's Division reached Plan del Rio (45 miles out) stragglers were coming in all the next day; and General Twiggs reported that Patterson's men were so exhausted by this short march that it was necessary to postpone the battle a day or two in order to give them time to rest and recuperate. A situation which added to the misery of the sick and exhausted was the total lack of ambulances. The ailing were divided into two classes: those who were able to march and those not able. As far as was possible, the latter were carried on the wagons, but we have seen that the wagons were deficient in numbers. Many miserable wretches followed the trains on foot, and the volunteers complained of the orders given the rearguard of regulars to use the bayonet on stragglers. This harsh treatment was necessary, for the road was not kept open and bands of guerillas roamed the country, assassinating all stragglers whom they found. Semmes said of the road to Cerro Gordo:

> Henceforth we began to meet more frequently the signs of war on the road. The miserable huts of the natives were all deserted, their late occupants having run off in great alarm at the approach of the terrible *voluntarios*. Dead horses and mules, and the carcasses of cattle slain for the subsistence of the Army, lay strewn along the road, and now and then a blackened spot showed where a hut had been burned.

Now and again the blackened body of an American soldier was also to be seen.

The National Bridge, 32 miles, was reached in three days, and Plan del Rio, where the level plain ends and the ascent to the plateau begins, in four days. This point is about 45 miles from Vera Cruz. Twiggs' Division and the cavalry reached Plan on the 11th, to find the hills, and especially one high mound known as Cerro Gordo, well fortified and defended by a strong force of Mexicans with thirty guns. Twiggs intended to attack, but next day Patterson's Division came up, in command of Pillow. Patterson, who was sick, at once left the sick status, took command of his Division and, as he outranked Twiggs, forbade an attack until General Scott should arrive. It was a common thing for a brigade or division commander to be absent on account of sickness. General Scott arrived on April 14th and decided to wait for Worth's Division. A dress parade for the General on the 15th demonstrated the condition of the clothing of the volunteers. An observer said:

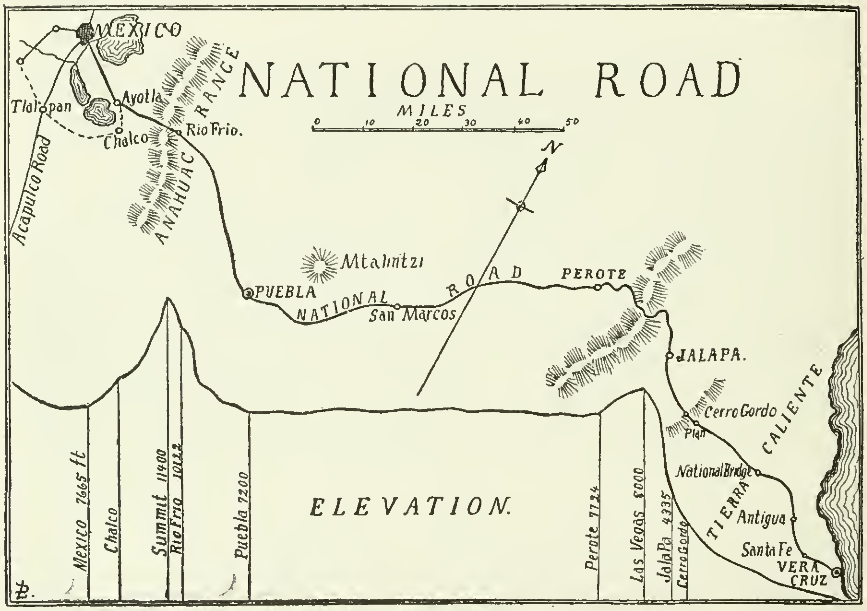

FIG. I

> Though in service but a short time they appeared in straw hats, caps, Mexican hats, boots, shoes, Mexican coats, some only in shirts and pants; and on the whole made a fantastic parade rather than a military formation.

Semmes also wrote of the uncouth appearance of the troops a little later; and the Mexican writers often compared them disparagingly with their own well-uniformed soldiers, looking at these rough backwoodsmen as the dandies of Rome might have looked at the Goths and Huns. No one, however, disparaged their fighting qualities. President Polk said in his December Message: "Much of the suffering experienced by the volunteers was due to a want of proper clothing," and proposed that in future they be furnished clothing in the same manner as the regulars. This problem of putting volunteers on the same basis as regulars was a difficult one, as yet hardly solved.

General Worth's Division arrived on the 16th. All the Army was now at hand save Quitman's brigade of volunteers, which did not leave Vera Cruz until the 17th. Most careful reconnaissances of the enemy's positions were made, with preparations for an attack on the 18th. A temporary hospital was established in a few poor huts at the village of Plan, immediately in rear of the camp. The sick who were unable to march were placed here and some little preparation made for the expected wounded. Some idea of the medical equipment may be gained from a letter of Lieutenant Stevens of the Engineers. While riding out to reconnoiter the Mexican position on the 17th a hernia of boyhood days returned. He tells how Dr. Brown relieved the pain by cold water applications and says that Dr. Tripler had a single truss (the only one in the Division) which, fortunately, happened to fit him! He was obliged to ride to Jalapa in a wagon and was troubled by the hernia during the remainder of the campaign.

One cannot fail to be impressed with the supreme confidence of General Scott when about to attack this strong Mexican position on the hills above Plan del Rio. His order provided for the measures to be taken "when the enemy retreats," so sure was he of their retreat.

Extract from Order for Battle:

> PLAN DEL RIO, *April* 17, 1847.
>
> As soon as it shall be known that the enemy's works have been carried, or that the general pursuit has commenced, one wagon for each regiment and battery, and one for the cavalry, will follow the movements to receive, under the direction of the medical officers, the wounded and disabled, who will be brought back to this place (Plan) for treatment in general hospital. The Surgeon General will organize this important service and designate that hospital, as well as the surgeons to serve in it.
>
> By command of Major General Scott. H. L. SCOTT, *A.A.A.G.*

Yet the general did not think highly of his troops, for when General Pillow protested against making a frontal attack with inexperienced volunteers he replied that "the regulars were very much diluted with recruits and not so good as raw militia just from home," as Hitchcock relates in his diary.

The Battle.—The *tierra caliente*, a fairly level plain, terminated at Plan, the site of the camp. From that point the road ascended in a long, circuitous route among the hills, all intrenched and held by the enemy. The main works were on the left of the road and were flanked on the extreme left (American) by an impassable ravine. On the right of the road and further back is the hill of Cerro Gordo, variously estimated at from 500 to 700 feet in height. This hill was known to the Mexicans as *El Telegrafo* and had strong works and a tower on the summit.

Half a mile still further back on the road to Jalapa was the Mexican camp and a battery of five guns. To the right the country was so wild and broken that the Mexicans thought it impassable for troops; but the indomitable engineer officers demonstrated that a road to the enemy's rear could be made in that direction, and it was done.

General Scott's plan of battle was to turn the Mexican left and attack their rear, while menacing the front. On the afternoon of the 17th General Twiggs' Division was moved out by the engineers' road and, after some fighting, took possession of a hill confronting the Cerro Gordo hill. Shields' brigade had been added to Twiggs' command, and Worth's Division was to follow as a support. At the same time Pillow was to threaten the works in front. On the morning of the 18th Twiggs assaulted Cerro Gordo hill and, after hard fighting, carried it. The Mexican troops posted there fled but were intercepted by Shields, who had marched still farther to the rear and now captured the troops and guns at their camp. Pillow, on hearing the sounds of battle, had moved to assault the works on his front. This attack was unsuccessful, the volunteers being obliged to fall back, with considerable loss. But the American victory in the rear cut off these Mexican troops, and they surrendered with their guns. The battle was over at 10.40 in the morning. The fruits of victory were: 3,000 prisoners, 37 guns and most of the equipment and baggage of the Mexican army. The cavalry,

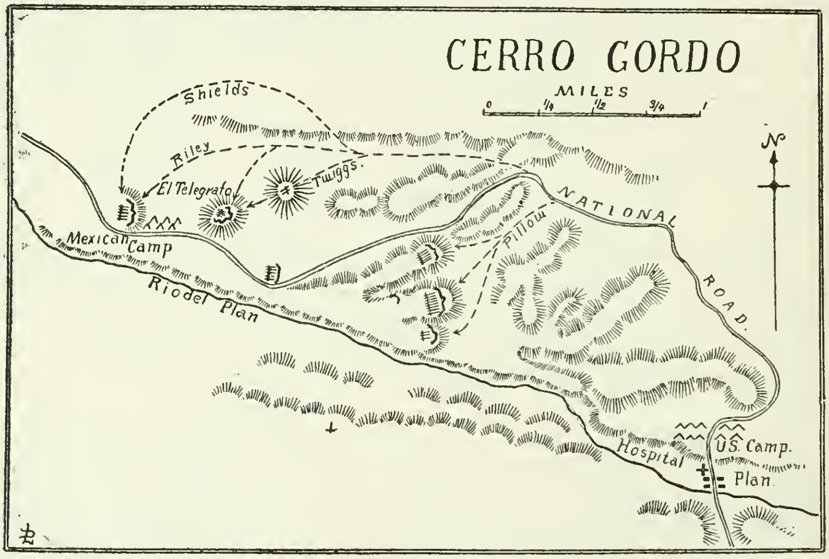

Fig. II

which had been held in reserve, was sent forward to join Twiggs' and Shields' troops in the pursuit, and the remnants of the Mexican army were dispersed. General Santa Anna, with a few followers, left the main road and escaped through the hills.

The Wounded.—The little village of Plan del Rio had been selected by General Scott as the site for the parking of supply wagons and also for the general hospital. It was the natural and only possible location. We may imagine what slight preparation was made. In the village some of the poor huts, deserted by their owners, were taken for shelter. Some of the few company tents may also have been utilized. In these, on the dirt floor, or on blankets when such could be found, the wounded were to lie. There was no hospital furniture, not even bedding. The sole medical equipment was a small supply of drugs, instruments and dressings; one wagonload to a division. To man this crude hospital surgeons were taken from the regiments, which, as a rule, had but one each. For nurses and cooks soldiers were detailed—after the battle.

To collect the wounded there were neither hospital corps nor ambulances. As we have seen, the Quartermaster had been directed to have a wagon ready for each regiment, waiting to follow the troops and bring in the wounded; rough riding for wounded men, but there was nothing better. There were no men especially detailed for collecting the wounded during the battle. It appears that the surgeons followed their regiments closely, giving what aid they could and directing those able to walk to the hospital. Those who were unable to walk had to remain where they were until the battle was over. Fortunately, at Cerro Gordo that time was not long and the wounded were collected before night. The Army was supplied with litters, but it was not necessary to carry the wounded far; the enemy had fled, and wagons could go wherever the ground was passable. One report speaks of the "pioneer parties" bringing in the wounded, but no mention is made of bandsmen engaging in that work. The battle was fought on high, barren hills, over several miles of ground, with poor roads and neither shelter nor water at hand. The surgeons were engaged during the day in collecting the wounded, and during the entire night and following day in dressing their wounds and in operating. The first dressing was generally applied in the field.

The casualties in this first battle were: killed, 64; wounded, 353. Of the wounded, 35—or 10 per cent—are reported to have died. The number engaged was not above 6,000, so the loss was about 7 per cent. Lieut. Stevens says the wounds were generally slight, and this may be believed, except the wounds by artillery fire. The muskets used by the Mexicans were of an old pattern, carrying a round ball which did little damage compared with the conical rifle ball of modern times.

An observer after the battle said of the hospital:

> The hospitals at Plan presented a pitiful spectacle; all the little cane buildings on the side of the road were filled with wounded men, who were ranged along on blankets, stretched on the bare earth. They lay in their ordinary clothing, in many instances stiff with blood. In every possible way they were wounded. Walking around were some who had been slightly wounded. Some were delirious and groaning with pain, some dying, some dead. The burial ground near by was continually receiving victims.

When the Army advanced on the 20th the 1st Artillery, serving as infantry, was left behind to care for the wounded. The surgeons who had been detailed to the hospital rejoined their regiments on marching, and accompanied them to Jalapa, leaving but one surgeon to care for some 200 wounded. Lieutenant Coppee, of Company I, said in a letter written to his home:

> Magruder's Company was left at Cerro Gordo for a few days to aid in caring for the wounded and burying the dead. I remember that Dr. Steiner, who was also left, had his hands full. Mexican surgeons who came up did not help him; and some American surgeons, not having orders, did not remain, as I thought they should have done, when there was so much suffering to assuage. I felt quite happy to be even a very inexpert assistant. I think the doctor will remember my holding some arms and legs while he amputated.

Among the spoils of war was the traveling carriage of General Santa Anna. This vehicle was made good use of on continuing the march to Jalapa. Major Smith, of the Engineers, who also suffered from a hernia, and Major Simmons, of the Dragoons, who had been wounded, rode in it. This carriage was perhaps the nearest approach to an ambulance that the Army possessed.

Part of the sick and wounded—the less serious cases—were sent back to Vera Cruz by a returning supply train. The greater part, and all the more serious cases, were retained at Plan, and later sent forward to Jalapa by a large wagon-train coming up from the coast. They reached Jalapa on April 27th, nine days after the battle. The Army had reached Jalapa (22 miles from Plan) on the 20th, and established a hospital there on the 21st. When Lieut. Ralph Semmes (U. S. Navy) passed Plan two weeks after the battle, he remarked that the field was deserted and even the graves unmarked.

> As the Army marched without tents and almost without baggage, in consequence of the deficiency of transportation, it had been obliged to construct for itself temporary arbors or sheds, composed of branches of trees. These were still standing, as memorials of the privations undergone on the eve of its great victory. To clear the campground it had been necessary to burn several huts. It was here our hospital

had been established during and after the battle; and a number of newly made graves on the left of the road, showed where such of the unfortunates as had died after being borne from the field, had been buried. The poor fellows who tenanted them had already been forgotten; there being no mark by which one grave could be distinguished from another. The shout of glory that had gone up in the United States over the victory of Cerro Gordo, recked not of them. They were of the humble rank and file, who bear the brunt of war and are crushed beneath the wheels of the car.

The wounded, as a rule did well, probably on account of the climate and from little meddling operating. The case of General Shields illustrates the common opinion regarding chest wounds at that time. Shot through the chest by a shrapnel ball, he was at first reported dead; then as mortally wounded, since it was not believed that a man so wounded could possibly recover. He was taken to Jalapa, improved rapidly and joined the Army before the city of Mexico, where he was again wounded. He survived to take part in the Civil War and has the credit of repulsing an attack by Stonewall Jackson.

THE HALT AT JALAPA

Climate.—The Army reached Jalapa on April 27. This city of 8,000 people was entered without opposition, General Santa Anna having fled with a few followers in another direction. The elevation of the place is 4,335 feet and, as compared with the coast region, it is healthful. Jalapa, or Xalapa, still retains its ancient Aztec name, and although it ships out to the world the well known medicinal plant of that name, it did not prove a healthful place for the Army. It had long been a resort for wealthy Spaniards, being well above the yellow fever level, but it lies just at the elevation of the cloud strata drifting in from the Gulf of Mexico, and during the greater part of the year is either shrouded in mists or drenched with rain. After the heat of the lowlands it proved uncomfortably cold.

The volunteers were encamped mostly in the open fields, still without tents. The weather was cold and rainy and sickness increased. The men sought to enter the city but were prevented by a guard of regulars; whereupon they built huts for themselves, taking whatever material they could find for the purpose. Transportation was still no more than half what it should have been, and but little in the way of supplies could be obtained from the country. The rains continued and the soldiers called the place Camp Misery. The Surgeon General made an examination of the site and pronounced it bad, but little or no improvement appears to have been made.

On reaching Jalapa General Worth's Division marched on at once to Perote, but Twiggs' Division and the volunteers remained at Jalapa about four weeks. The time was spent in bringing up supplies and refitting the Army, before marching further into the interior. General Scott wrote regarding the troops at this time:

> Unfortunately very many of our men, regulars as well as volunteers, have lost both greatcoats and blankets, and the volunteers are otherwise badly clad.

The supplies which he thought necessary to be brought up from the coast were: "medicines and hospital stores, salt, ammunition, shoes for animals, and coffee." Articles a little less important which he thought might be procured in the country were: "sugar, flour, fresh meat, beans and forage." Yet up to this time he had secured few supplies from the country, the season being too early.

The Hospital.—A general hospital was established in a number of convent buildings in Jalapa, on April 21, in charge of Assistant Surgeon Adam N. McLaren. The number of patients received from this date until the hospital was closed, on June 30, was 998. By the latter date 205 of these had died, or one out of every five men. Doubtless more died later. No wonder soldiers shunned the hospitals in Mexico. To enter one was twice as dangerous as to go into battle.

In the beginning this hospital was like the others, a mere shelter for the wounded. General Scott said, "That building will be the hospital," and a hospital it became. This one was probably even more destitute of all essentials than the one at Vera Cruz. The "English Soldier" says:

> Some allowance must be made for the imperfect state of order inseparable from a campaign; but after every liberal deduction there will still remain a large amount of blame for the state of things existing in the hospital at Jalapa. I passed through it several times, having been sent there on various duties, and the scenes which I saw gave me most painful and shocking impressions which I witnessed during the whole campaign.
>
> Sick men, some of whom were wounded, and others wasted to skeletons by diarrhoea, and in the last stages of illness, lay on thin pieces of matting, or on dirty doubled-up blankets, on the cold, hard, brick floor. Many of them had on shirts which they had evidently worn for weeks, and I was told by some of the patients that nearly all were infected with vermin. Their diet was bread and coffee, which few of the men could eat. I should be very sorry to attach blame to any person in particular for this notoriously bad management; but can scarcely help thinking that as a considerable sum of money had been secured at Cerro Gordo, a large portion of it might have been very beneficially employed in remedying these evils. At least clean and comfortable bedding might have been furnished to the patients, who might also have had their linen washed. There was an abundance of soap and water in Jalapa, and hundreds of poor women who would have been glad to have had employment.

This moderate statement is not overdrawn, at least for the early days of the hospital when it could not have been properly equipped. It was not described at this time by any medical officer, but when reopened in November Surgeon Otis Hoyt of the Massachusetts Regiment said of it:

> The hospital was opened for the receipt of patients on the 15th, or rather an order was issued for the surgeons to send their sick immediately to the hospital. At that time we had neither medicines, cots, blankets, mats, cooking utensils, not anything prepared for them. Most of the patients had but one blanket and many had none. The weather was cold and damp, and for several days the men had no other bed than a cold, damp, brick floor. Neither straw, blankets, mattresses nor cots could be procured for several days. In consequence of this state of things many who had been previously reduced by severe diarrhoea died. This state of things will account for the large percentage of deaths in November.

He says in effect that many died from neglect. All this was not known at home; on the contrary, the public was probably assured that the Army was in fine condition. If we trace this neglect far enough we shall find that the basis of it was organization for peace, not for war.

During December, 1847, the hospital at Jalapa received 445 patients and lost 97 by death; almost one in four. Nor was this an exceptional hospital. It was probably typical of the entire campaign; a large building designated as a hospital; a few drugs, instruments and dressing furnished; a young assistant surgeon or two assigned, with convalescent soldiers as nurses and attendants, and the thing was done—except to bury the dead. Cooks, nurses and other attendants, being convalescents, doubtless spread disease.

As already stated, General Worth did not halt at Jalapa, but marched on across the eastern mountain range to the strong town and castle of Perote. This great mountain fortress, well named "The Rock," was occupied on April 22nd without resistance. A hospital was established on April 23rd, in the castle, by Surgeon John Reynolds of a Pennsylvania regiment. It received sick from the garrison and from all troops coming up from the rear. Perote was held permanently by a small garrison of Pennsylvania volunteers, but Jalapa was soon abandoned. The elevation here was 7,724 feet, which should have rendered the place salubrious, but it did not prove so to the Army.

General Worth's small division, some 3,000 men, left 183 sick at Jalapa and 54 at Perote a few days later. After June 30, Perote was the only garrisoned post between Vera Cruz and Puebla, a distance of 185 miles. In August, with an average of 300 patients, there were 119 deaths; almost four daily. Practically all these deaths were from disease, as there was no fighting in this vicinity. Surgeon Adam McLaren was then in charge and thought it necessary, in his report, to explain the high mortality. He said:

> The number of deaths (119) can be readily accounted for—a large majority of the cases who were admitted into the hospital had contracted disease on the march

from Vera Cruz to this place; many of them were in a moribund state when received, being without tents and almost destitute of clothing they had suffered severely on the march. Every wagon train that has passed this place for Puebla has left a large number of sick, in the lowest condition of filth disease, crowding the hospital far beyond its means of accommodation. We were obliged to occupy bombproofs *as sick wards.* The number of sick and convalescents now remaining is nearly 300, nearly all doing well. Every comfort, as far as procurable, has been purchased for them, in the way of diet, out of the hospital fund.

During July and August thousands of men had been going to the front, the new regiments and recruits to replace old ones. They were all green men, ready to fall a prey to the climate and the diseases of the country.

The Army was dangerously depleted at Jalapa by the loss of most of the volunteers, as well as by sickness. The term of service of six regiments would expire in June and the men refused to reenlist. Not only had their time expired; their clothing was worn out and they were thoroughly disillusioned as to the pleasure of campaigning in the Land of the Montezumas. It cannot be denied that they had been badly cared for. On May 5 six regiments took the road for Vera Cruz, whence they were returning to New Orleans for discharge. This weakened the Army by 3,600 men and left less than 7,000 of all arms for duty. The only volunteer troops remaining were the 2d New York, the 1st and 2d Pennsylvania, the South Carolina Regiment and some companies of Texas cavalry. These remained throughout the campaign and bore an honorable part in all its battles. The departure of the other regiments in the middle of the campaign was only one of many faults of foresight on the part of Congress and the authorities at Washington. Had General Scott been given 15,000 men at Jalapa on May 15 he could have marched to the City of Mexico in less than thirty days, with almost no opposition.

Twiggs' Division left Jalapa on May 22, en route to Perote and Puebla. A few companies of Pennsylvania volunteers were left as garrison and guard for the hospital. No garrison post could be established in the *tierra caliente*, on account of malarial and yellow fevers; but it was hoped that two posts could be maintained on the plateau—Jalapa and Perote. But early in June the loss of volunteers and the weakening of the Army by sickness caused the General to order the abandonment of Jalapa, only Perote being held. On June 3rd he wrote from Puebla directing that the garrison be withdrawn to Perote, bringing with it all the sick and wounded that could be moved. Those whose lives would be endangered by such transportation were to be left at Jalapa, with a surgeon and attendants, at the mercy of the Mexicans. To the Commanding Officer at Jalapa he wrote:

> You will leave such patients as cannot be transported, with a medical officer and the necessary attendants. . . . You will place them in some consecrated place, under the safeguard of the Church and civil authorities; with the most solemn assurance given to each, that if the slightest injury should be inflicted on any individual of the party—that I will not fail to return to Jalapa and punish the entire city in the most signal manner. Explain to all the rules of war in such cases. Military hospitals are invariably regarded by civilized nations as sacred.
>
> P. S. Besides one or two medical officers at Jalapa, it will be necessary to leave two or three at Perote. About 200 ambulances [?] will be sent down to you, to leave tomorrow.

The garrison left Jalapa on June 18 and the hospital was entirely abandoned on June 30. In the meantime the patients had not been molested.

During this time and later reenforcements were constantly moving up from the coast, where yellow fever and malaria now prevailed. These columns left many sick at Perote, as Surgeon McLaren stated. Colonel McIntosh, who brought up the train with the fabulous amount of gold specie, said:

> Immediately prior to leaving Vera Cruz the men had been much dispirited by sickness, and by seeing many of their comrades transferred to the general hospital, where, through prejudice to be sure, they were led to believe that death was certain, from inattention or from yellow fever.

When Colonel McIntosh arrived at Puebla he had 83 sick and 484 for duty, and had doubtless left a considerable number at Vera Cruz and Perote. He had lost twenty-four wagons in a skirmish near the National Bridge. In this affair the Medical Director of the Army, Surgeon B. F. Harney, was slightly wounded.

The general policy was to retain all sick with the Army. That some of the less serious cases were sent to Vera Cruz by returning wagon trains is shown by a news item of May 3rd in the *New Orleans Pickayune:*

> About one hundred wounded and discharged officers and soldiers arrived here [Vera Cruz] from Jalapa yesterday. Some five or six of the officers were brought down on litters, and will sail as soon as possible for New Orleans.

I am inclined to believe that the litters mentioned were horse litters, that is, carried by horses or mules. A captain of the 6th Infantry was later carried the entire distance from the City of Mexico to Vera Cruz on a mule litter.

March to Puebla and Delay There.—On May 8 General Worth's Division left Perote for Puebla, distant about 70 miles, followed by Quitman with the now small division of volunteers. On May 14 this force had reached Amozoc, and after a little skirmishing there Worth entered La Puebla de las Angeles without opposition on May 15. General Twiggs' Division left Jalapa on May 23 and arrived at Puebla on May 29. The entire Army was now at Puebla, except the sick and the small garrisons at Vera Cruz, Jalapa and Perote. Many wagons and mules had reached Vera Cruz, and trains of 100, 200 and as many as 400 wagons were sent to the front, guarded by bodies of recruits or the new levies that were beginning to arrive. The Army had reached Puebla with no more than 6,000 men for duty. It now had an abundant transport column, which was not so much needed as earlier; for, after leaving Jalapa, subsistence for both men and animals was drawn almost entirely from the country. At Puebla the new crop of wheat was being harvested, furnishing flour in abundance. There was also an abundance of fresh beef to be had. Both Generals Taylor and Scott had been directed to subsist on the country by forced contributions, but had been slow to do so.

Delay at Puebla.—General Scott now considered his force too small to proceed farther into the interior of the country, and halted at Puebla awaiting reinforcements for nearly three months. In February Congress had provided for ten new regiments of Regular troops, which were being enlisted and sent to Vera Cruz by companies. On the 8 of July Generals Pillow and Cadwalader arrived with 4,500 men, of the new regiments and recruits. This brought the Army up to 10,276 officers and men, of whom 2,215 were sick. On July 19 General Franklin Pierce left Vera Cruz with 3,000 men and on August 6th he reached Puebla with 2,429, reporting that he had lost but one man from *vomito.* There were now six of the new regiments at Puebla, and they were organized into a division of two brigades under General Pillow, with Pierce and Cadwalader as brigadiers. It seems remarkable that these new regiments were officered almost entirely by inexperienced volunteer officers. Not only were the company and regimental officers practically all inexperienced, but the brigade and division commanders were what Hitchcock called "mushroom generals." Lieutenant Kearney says that the colonels were nearly all appointed from civil life, and one of them was a cadet who had been dismissed from his class.

Continued Sickness.—In spite of the altitude of Puebla, 7,200 feet, the apparently healthful location and the abundance of supplies, sickness continued. The weather was cold, rainy and changeable, and the sick report grew. The men were still largely without tents and were quartered in damp, low and unhealthful buildings. Then, too, the columns from Vera Cruz—all recruits—brought many sick. Every wagon train from the rear left its load at the hospital. It seemed that men sickened and died almost as fast as reinforcements came in. Of 900 recruits, 200 were sick in a short time. Diarrhoea and dysentery were still the most prevalent and fatal diseases. There were so many of these emaciated sufferers that all could not be accommodated in the hospitals, and many of them were put on whole or part duty. These anaemic and wasted convalescents were called in the picturesque Army slang of the day, the "Diarrhoea Blues."

While in Puebla the Medical Directors, Surgeons Satterlee and Tripler, had been called on for reports on the causes of the excessive sickness. They named exposure, change in food, poor rations, poor quarters, ignorance of soldier life, weakly men, the rainy season, altitude, lack of cleanliness, poor cooking, and many other similar causes. Surgeon Satterlee said, "There is a great want of personal cleanliness; many patients have not bathed for months; for weeks they have not changed their clothes, and are often covered with vermin."

A hospital had been organized at Puebla, with Surgeon William J. Barry, U. S. Army, in charge. It was soon filled, and when the Army moved forward on August 7-10 more than 2,000 sick and convalescents remained behind. The garrison left at Puebla consisted of six companies of the 1st Pennsylvania, two companies of the 4th Artillery, and one company of Dragoons, all under Colonel Childs and numbering about 500 men for duty. A sample of the mortality in the hospital is offered by the report for December, Surgeon Madison Mills, U. S. Army, being then in charge:

Remaining from November,	514.	Admitted,	669.	Total,	1183.
Returned to duty,	599.	Died,	105.	Remaining,	491.

For months this hospital had an average of about 500 patients and more than 100 deaths. It would be safe to say that 20 per cent of cases ended in death. And a large portion of the Army entered the hospitals. Surgeon Tripler, Medical Director of Twiggs' Division, reported on July 16:

Sick able to march	156
Sick not able to march	147
Sick left at Puebla	252

The total is 555 in a division of less than 3,000 men. There were still other hundreds left at Vera Cruz and Perote—if not dead. During October this Division, then numbering 5,724 men, lost 234 by death from disease; a rate of 40 per thousand, or 480 per thousand per annum. The average number of sick was then 1,500, or nearly 30 per cent of the command. This rate may be compared with the rate of one and one-half per cent, existing in our forces on the Border in 1916. Of conditions at Puebla "The English Soldier" said:

> The convents and public buildings in Puebla afforded ample accommodations to our Army, but few of our men seemed to enjoy robust health. The sick list and the hospitals were filled to overflowing, and one-half those doing duty, wasted with diarrhoea, looked like skeletons of men; the hardships and privations of the previous part of the campaign telling more or less severely upon all; and one could not walk

> far through the streets of Puebla without hearing the mournful strains of the soldier's funeral procession. At Perote, too, where a large number had been left, the sick died on an average of ten or twelve a day [exaggerated! L.C.D.] for a series of months. These were interred without any military formalities, or even the usual burial service; being wrapped in the blankets in which they died, they were carted out and thrown in pits, dug for the purpose daily outside the garrison.

The soldier might appropriately sing:

> "Wrap me in my old stable blanket, and say a poor lancer lies low."

While at Puebla Hitchcock had written in his diary: "This army is in a critical situation . . . there is a great deal of sickness . . . the General said last evening that he could not leave here with over 4,000 men." On June 4 General Scott wrote in a latter: "We have about a thousand sick at Verz Cruz, 1,000 at Jalapa, 200 at Perote, and 1,017 here. We have but 5,820 effective enlisted men." Those able for duty were still lacking in tents and clothing. The General wrote on July 25: "The Army is suffering greatly from want of necessary clothing, including blankets and overcoats. We now have 1,000 hands making shoes and pantaloons. About 3,000 pairs of each are absolutely necessary to hide the nakedness of the troops." Yet the Army had been fairly well supplied at Jalapa, before advancing on Puebla. It seemed necessary to learn by experience that soldiers must be as regularly supplied with clothing as with rations. It would be interesting to know how long, on an average, a pair of shoes and a uniform last in campaign.

General Scott's order on marching throws light on the method of supplying hospitals with personnel.

> "G. O. No. 123, *Jalapa, April* 30, 1847.
>
> P. 15. Every regiment that leaves wounded or sick men in hospital will take care to leave a number of attendants, according to the requisitions of the principal medical officer of the hospital. Those least able to march will be selected as attendants. This rule is general.
>
> By command of Major General Scott," etc., etc.

Surgeon Justin M. Brown says that the condition of the Army as to health during the summer at Puebla was bad. Disease was more to be dreaded than the Mexicans. This was no exaggeration, for during the whole war the Army lost 1,549 men at the hands of the enemy, and 10,951 died of disease; or seven men from disease to one man killed or died of wounds. Early in July there were in all the hospitals 3,200 patients and not more than 6,400 men for duty. The loss from conflict with the enemy, then, was almost negligible, yet one-third the Army was in hospital.

While at Puebla, some changes were made in the status of certain medical officers. During the march Surgeon Satterlee had been senior surgeon of Worth's Division, Surgeon Tripler of Twiggs' Division and Surgeon J. J. B. Wright of Patterson's Division. It appears that Tripler was made Medical Director of the 2d Division (Twiggs') on June 3, and Satterlee of the 1st Division on July 16. Surgeon General Lawson was still with the Army and Surgeon B. F. Harney served as Acting Medical Director of the Army until the city of Mexico was reached. I can find no mention of Medical Directors for the 3d and 4th Divisions, those of Quitman and Pillow. It does not appear that the position carried any considerable authority, and we find these Directors treating cases of disease and injury, leading one to infer that their duties were largely professional.

From Puebla to the Valley of Mexico.—General Scott had reached Puebla in May with no more than 6,000 officers and men for duty. During his three-months' stay there he received reinforcements amounting to about 8,000 men. He had also received hundreds of wagonloads of supplies. He now had six new regiments of so-called regulars and his old regiments had been recruited up to nearly their former strength. Wagons were now so plentiful that each division of less than 3,000 men had from 200 to 300 wagons. There was also a large packtrain, one force coming from Vera Cruz having brought more than a thousand pack mules.

Leaving a garrison of about 500, and some 2,000 sick, in Puebla, the last stage of the march was begun on August 7. Harney's small brigade of cavalry and Twiggs' Division marched out on that day. The Divisions of Quitman, Pillow and Worth followed on successive days, so as to be within supporting distance of each other. General Scott said in his report that the force which left Puebla numbered 10,738 officers and men. The Army had been reorganized and now consisted of four small divisions, as follows:

First Division, Old Regulars, General William J. Worth
- 1st Brigade, Colonel John Garland
- 2d Artillery, as Infantry
- 3d Artillery, as Infantry
- 4th Infantry
- 2d Brigade, Colonel N. S. Clarke
- 5th Infantry
- 6th Infantry
- 8th Infantry
- Light Battery A, 2d Artillery

Second Division, Old Regulars, General David E. Twiggs
- 1st Brigade, General Persifer F. Smith
- 1st Artillery, as Infantry
- 3d Infantry
- Mounted Rifles

- 2d Brigade, Colonel B. Riley
  - 4th Artillery, as Infantry
  - 2d Infantry
  - 7th Infantry
  - Engineer Company
  - Ordnance Company
  - Light Battery K, 1st Infantry

Third Division, New Regulars, General Gideon J. Pillow

- 1st Brigade, General Franklin Pierce
  - 9th Infantry
  - 12th Infantry
  - 15th Infantry
- 2d Brigade, General George Cadwalader
  - Voltigeur Regiment
  - 11th Infantry
  - 14th Infantry
  - Light Battery I, 1st Artillery

Fourth Division, Volunteers, General J. A. Quitman

- 1st Brigade, General James Shields
  - New York Regiment
  - South Carolina Regiment
  - Battalion, Marine Corps
- 2d Brigade, Lieutenant Colonel S. E. Watson
  - 2d Pennsylvania
  - H Company, 3d Artillery
  - C Company, 3d Dragoons
- Cavalry Brigade, General William S. Harney
  - Batts of 1st, 2d and 3d Dragoons
- Siege train, mortars and howitzers

The distance from Puebla to the city of Mexico is about 75 miles, and to a point where resistance might be expected, about 50 miles, or a four-days march. The road was still good, but rose from the plateau of Puebla, 7,200 feet in altitude, to a height of 11,400 feet in the Anahauc Range, half way to the city. Connection with the base at Vera Cruz had been slight heretofore. No attempt had been made to keep the road open as a line of communications. But, since there was no Mexican army in the rear, only marauding bands of guerillas, troops and even small parties went and came on the road with slight molestation. Occasionally a train was attacked and a few men killed, but nothing more serious happened. Leaving Puebla, a base was no longer considered. As General Scott said, he decided to "throw away the scabbard and advance with the naked blade in hand." For all practical purposes there was no longer a base, for it was too far away for reinforcements, and none were there.

Resistance was expected in the mountains west of Puebla, but none was encountered. The advance reached Rio Frio, 40 miles out, on the 9th, and crossed the range that day. After the toils, hardships and battles of the long march, after the many delays, the little army at last crested the barrier range of Anahuac, and there before them lay the glorious Valley of Mexico. There in shining silence lay the beautiful lakes and there among them the splendid city, smiling and inviting as in the days of Cortez, surrounded by a score of charming villages and towns. The column moved slowly down the western descent, and on

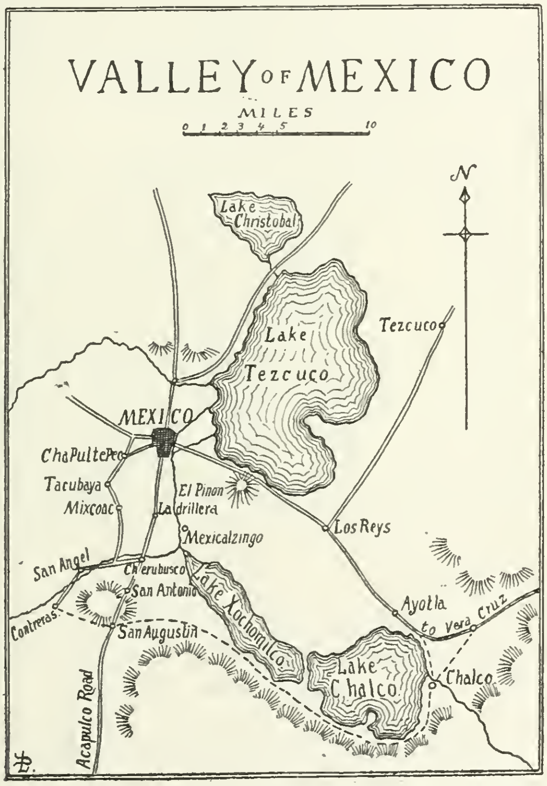

Fig. III

August 11 Twiggs' Division reached Ayotla, but 16 miles from the city. The other divisions were from 5 to 20 miles behind. It was now necessary to halt, close up the column, reconnoiter, and probably give battle.

From Ayotla the direct road ran through the low ground between the Lakes Tezcuco and Ozomilcho, and then straight on to the city. Near Lake Tezcuco it was overlooked by a high, fortified hill, El Pinon. Near Lake Ozomilcho there was another road, but it also was defended by fortifications at Mexicalzingo. Several days were spent in careful reconnaissance of these roads and fortifications. It was determined that either of them might be carried by assault but the loss would be greater than the small, isolated army could safely afford. The road around the northern shore of the lakes was long and known to be held by the principal Mexican army, which had been brought south after the battle of Buena Vista. Meanwhile, General Worth had come up with the rear division and crossed to Chalco on the eastern shore of Lake Chalco. He had the trail around the southern shore of the lakes examined, and, although the Mexicans believed it impassable for troops, reported that it could be made passable. It was a volcanic region, much cut up by ravines, but that did not stop the resolute little American Army. General Scott now resolved to leave the National Road, march around the southern end of the lakes, and strike the great southern highway, the Acapulco Road, at San Augustine (or Tlalpan). The army was reversed. Worth's Division now took the advance from Chalco, Quitman and Pillow following; Twiggs' Division, now the rear, remained a day at Ayotla to threaten El Pinon. By the 18th the advance had reached San Augustine and had grasped the Acapulco Road, the divisions with their trains filling the road back to Ochomilcho. The plan now was to advance along the great southern causeway to the gate of San Antonio Abad, as Cortez had done three centuries earlier. But when General Worth pushed out scouting parties they had not proceeded two miles when they found the Mexicans in force at the fortified convent of San Antonio. The advance party was fired on and Captain Thornton of the Dragoons was killed. Further advance was decisively checked.

The little Army was now at the crucial point of the campaign and the prospect was anything but bright. Cut off from the rear, at least from all present assistance, the small force was entirely dependent upon itself. Victory was necessary, and that soon, for supplies were all but exhausted. Inspector General Hitchcock says there was no forage for the horses and but four days' bacon and musty bread for the men. General Scott had little reason to feel cheerful as he rode along his army that day. On one road they were strung out, men, horses, guns and wagons; without tents and with insufficient clothing; the evening cold, and a misty rain coming on. In front was San Antonio, a rocky fortress, examined by General Worth and pronounced too strong for assault in their present small strength. The taking of it would cripple the army, and even if taken it seemed probable that still stronger works would be found beyond. What wonder that Colonel Hitchcock wrote that night, "Our prospects rather darken every moment." A turning movement was again resolved on, and again to the left, over a volcanic field, in the direction of San Angel.

Battles of Contreras and Cherubusco.—On August 19 the Army was in a rough line from San Augustine to a point two miles west, facing San Antonio and Contreras. From this position it advanced during the afternoon against the Mexican forces which occupied the general line of Cherobusco Brook, with advanced posts at San Antonio and Contreras. Worth advanced along the road toward San Antonio, the other divisions moving to the left, in the direction of Contreras. Fighting began late in the day and continued into the night. The enemy was sheltered behind stone walls and buildings. Our forces were without artillery, and little was accomplished. The night was cold and rainy, causing much suffering among the unprotected troops and still more among the wounded. In spite of the storm the surgeons worked throughout the night, giving such aid as they could.

The troops on the left got into good positions during the night and the battle was renewed at three in the morning. Worth's Division was to attack San Antonio, the other three converged on the Mexican position at Contreras. The Pennsylvania Regiment and the Marines were left to guard the depot and hospitals located at San Augustine (Tlalpan). The battle at Contreras was won in half an hour, the Mexican garrison being killed, captured or scattered. The American loss here was but 60 in killed and wounded. Worth now attacked San Antonio, sending one brigade to flank it, and that place also was captured after a brief resistance. Many guns as well as prisoners were taken at both places.

All the columns were now pushed forward against the main position at Cherubusco. Here, where there was a strong bridge-head and a massive, fortified convent, the remaining Mexicans had gathered. The place was attacked front and flank and finally captured, but only after hours of obstinate fighting in which the loss was very heavy; unnecessarily so, for the road by San Angel was open to its rear. The whole Mexican line of defenses was now broken, and the remaining troops fled in great disorder toward the city. The pursuing infantry pressed on along the Southern Causeway and did not halt until within a mile of the gates. Colonel Harney with a small body of dragoons charged up to the Gate of San Antonio Abad. It was here that Captain Phil Kearney, later heard of at Seven Pines and Chantilly, lost an arm. Colonel Mills is said to have fallen inside the Gate; a few horsemen did not hear the recall and pushed too far. The ground fought over was the very same that was so bitterly contested by Cortez, and Worth camped that night at Ladrillera, the Xoloc of old Bernal Diaz.

After this complete victory General Scott could easily have entered the city, and said as much in his report. But while he could beat the Mexicans in the field, they proved more than a match for him in craft. Taking unwise advice, he desisted at the very moment when all defenses were crushed, and thus gave time for a reorganization of the Mexican forces. On August 21 an armistice was signed, ending hostilities for a time. During the armistice, food supplies were allowed to enter the city and Americans were allowed to purchase food there.

The Army halted on the Mixcoac-Ladrillera line. It had taken 2,637 prisoners and 37 guns, including the two lost at Buena Vista. Losses in the two days of fighting were: killed, 139; wounded, 876; missing (probably killed), 28. Of the 876 wounded, 76 are reported to have died, a case mortality of less than 9 per cent. After the battle the wounded were collected at San Augustine, where the sick had been left, together with the supply and siege trains. General Scott said that the guard of this place held a post of honor, for the Army could not have existed without this depot. General Twiggs in his report said of the medical officers:

> The medical officers of the division, always ready to administer to the comfort of the sick and wounded, were particularly active on this occasion. With no conveniences for themselves, this admirable corps of officers spent the entire night, exposed to the pitiless storm, in dressing the wounded and alleviating their sufferings. I could not do less than give their names a place in this report: Surgeons: C. S. Tripler, B. Randall, and J. M. Cuyler; Assistant Surgeons: A. F. Suter, H. H. Steiner. C. C. Keeney, and J. F. Hammond make up the number.

General Twiggs' Division in this battle lost in killed and wounded 263 out of 2,640 engaged, or 10 per cent.

Many of the wounded were at first collected in the village of Cherubusco. Lieutenant Ralph Semmes, who was now attached to the staff of General Worth, says:

> General Worth encamped in advance of the other divisions of the Army, and it so happened that we pitched our tents in the very spot on which Cortez established his headquarters some three centuries earlier [Ladrillera, 1523]. A hospital was hastily prepared a short distance in our rear, and thither were carried all the wounded that could be found in the short space of time that intervened before dark. Notwithstanding our exertions, however, many a brave fellow who had been bereft of a limb, or otherwise mutilated, spent the night on the now deserted field of glory alone with his wounds and his anguish. As the shades of night began to close around, the sky became overcast by dull, murky clouds, and a misty rain set in—a befitting pall for the dead who lay strewn over the battlefield. The next day (21st) was devoted to the sad duty of collecting and burying the dead—the cornfields, dykes, ditches and other broken ground being carefully searched for any unfortunate wounded who might not yet have been found.

The hospital mentioned by Semmes in this somewhat rhetorical account was probably a mere collecting place in the houses of Cherubusco, around which some of the most deadly fighting had occurred. Other wounded were collected at San Angel, but the principal hospital was at San Augustine.

On the 21st, Headquarters were removed to Tacubaya. Worth's Division moved to that point, Pillow and Quitman were at Mixcoac, Twiggs near San Angel. The Great South Road had in turn been abandoned. The advance was to be made by way of Chapultepec, against the western gates of the city.

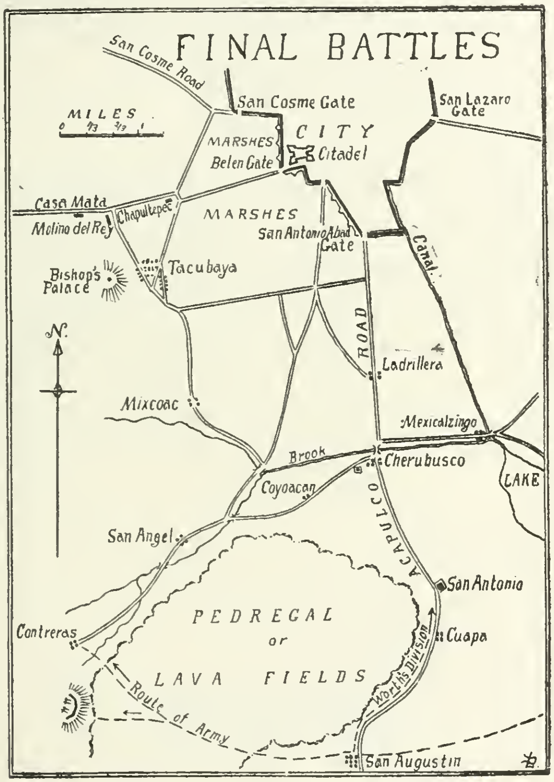

Fig. IV

A sad incident at this time was the disposal of some sixty-nine deserters, the so-called San Patricio Battalion, captured at Cherubusco, where they were serving the Mexican artillery. Tried by court-martial and sentenced to death, thirty-four of them were hanged September 10–13. A few who could prove mitigating circumstances got off with branding and imprisonment. This seemingly harsh treatment was necessary for the safety of the little army, entirely surrounded by enemies.

As to surgery on the field at this time, Surgeon Porter wrote:

> The most common practice adopted by the different surgeons on the field was, in the case of gunshot wounds, to extract, if possible, all foreign substances; and in cases where balls could be found, to cut for and extract them at once. A simple plaget of lint, and bandage, were in most cases all the dressings required. In some few cases compression and tight bandages were necessary to prevent hemorrhage. In case of fractures, most of which were compound and comminuted, the common practice was to extract all fragments of bone that were so detached as to endanger their vitality, and remove all foreign substances, then to apply bandages and splints. With regard to amputation upon the field, the rule generally adopted was—to amputate at once when the principal vessels and nerves of a limb had been destroyed. In case of fracture, where the bone was very much shattered and when important joints had been injured, amputation was also done.
>
> With regard to the treatment and subsequent termination of the cases, it may be stated that most of the simple flesh wounds healed rapidly and kindly under the dressings of lint, changed once in 24 hours, with an occasional aperient and proper diet. The presence of foreign substances, in the simplest wounds, frequently caused protracted suppuration and the formation of abscesses. Stimulants and tonics, such as brandy, wine, iron, and acids, were used freely and with marked benefit in all cases of debility consequent on suppuration. The gunshot wounds in which bones were injured proved most difficult to heal. In a majority of instances primary amputation was followed by favorable and secondary by unfavorable results. In the hospitals of the Mexicans almost one-half the wounded died, while of those treated by us not more than five or ten in a hundred died. [Twelve was the exact number. L. C. D.]

Bayonet and lance wounds were not common in Mexico. The brilliant charges of opposing columns in battle are almost always charges on paper.

(To be concluded)

THE RECURRENCE OF INFLUENZA IN A REGIMENT

By SAMUEL BRADBURY, M.D.

Formerly Captain, Medical Corps, United States Army[1]

LONGCOPE has written (1) of influenza in the Army in France as occurring in three phases; the first in April and May, 1918, the second in September and October, 1918, and the third in January and February, 1919. He speaks of a fourth phase, by which is meant the great number of colds and attacks of mild bronchitis from which the Army suffered during the period after the second phase.

During May and June, 1918, the 11th Engineers suffered an epidemic of influenza which caused the illness of 613 men in a total company strength of about 1,200. There were 2 deaths from complicating pneumonia. In this epidemic the disease was almost entirely limited to Company B in the last two weeks of May, and in the latter half of June attacked the other 5 companies. Company B had the earliest infection and the smallest number of cases as is shown in a chart in the report of that epidemic (2).

From early September until the next January the regiment was working in the St. Mihiel region and in the Argonne, and about 150 men of all companies had colds of varying degree, usually attributed to the living conditions at that time. There were 3 cases of pneumonia, 1 of which died.

In early January the regiment was grouped at Commercy and moved to Bordeaux for shipment home. In the vicinity of Bordeaux the men were billeted by companies in scattered localities; companies A and C in one camp of pyramidal tents, company B in a group of stone buildings, and companies D, E and F in another group of stone buildings.

Dr. Felix E. Ashcroft, at that time Regimental Surgeon, has given me the following figures. It is admitted that the figure for the total number of cases is approximate; those for the number of cases of pneumonia and for the deaths are accurate. Influenza was then present amongst the civilians with a daily mortality of 1 in 2,000 of population and the disease soon appeared in the regiment. During January and February there were about 270 cases, pneumonia developed in 35 men and of these 5 died.

Tabulating the cases in this epidemic with those of the earlier infection it is seen that by far the greater number in the second epidemic were in the 2 companies which had had the lightest previous infection.

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[1] Visiting Physician, City Hospital, New York, Assistant Visiting Physician, Gouverneur Hospital New York.

	May and June, 1918	*Jan. and Feb.,* 1919		
	Cases	*Cases*	*Pneumonia*	*Deaths*
Company A	78	65	9	2
Company B	74	120	18	3
Company C	126	25	4	0
Company D	128	60	4	0
Company E	123			
Company F	84			
Totals	613	270	35	5

Some of the patients in company B stated that they had had influenza in the earlier epidemic and Dr. Ashcroft noted that, as a rule, these were mild cases though it is not known if any developed pneumonia.

In May and June, 1918, over 50 per cent of the company strength of the regiment had influenza. During the second phase of the disease in France the men escaped the disease entirely, at least there was no sick rate that would in any way suggest any epidemic illness. In January and February, 1919, there was a definite second epidemic of influenza in the regiment, 22 per cent of the men being ill. Of these 12.7 per cent developed pneumonia and 1.8 per cent died. Neither the morbidity nor the mortality was high when one considers other groups of individuals.

One feels justified in assuming that the early epidemic had conferred sufficient immunity to keep the regiment free of influenza for 6 months and partial immunity extending through January and February, 1919.

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(1) W. T. Longcope, *J. A. M. A.*, 1919, 73, 189.
(2) S. Bradbury, *Am. Jour. Med. Sc.*, 1918, clvi, 737.

RESECTION OF THE ELBOW JOINT

By Major HIRAM A. PHILLIPS and Captain E. M. P. SWARD.
Medical Corps, United States Army

WHILE Chief of the Surgical Service, U. S. Army Base Hospital, Fort Sam Houston, Texas, there came before the clinic four cases of old gun-shot wounds of the elbow, which had resulted in ankylosis, in partial flexion, in an unfavorable angle. Upon examination, all cases presented identically the same condition; the olecranon, with triceps attachment was lost, with resultant fixation of the joint. On reviewing the joint, one was struck with the reason for the ankylosis, the loss of the triceps insertion. No matter how much injury to the joint proper, if the triceps and biceps are functioning, motion would probably be retained, for it is this condition of restoration of function of these muscles that is the aim of the operation. The method of joint resection with early passive motion is simple, feasible, and advantageous to the patient. Four cases were operated with apparent success. Incision was made to the outer side of the olecranon process, soft parts with the periosteum elevated, and the joint resected subperiosteally. The attachment of the triceps muscle was reinserted on the dorsum of the ulna.

In two cases, the entire olecranon was lost and it was necessary to pick up fibers of the triceps and make the attachment, for it is this reattachment of the triceps that makes the operation a success. Incision closed with rubber-dam drainage which was removed in twenty-four hours. Passive motion started on the fifth day. In no case was tissue interposed between the ends of bones, and in none was there hyperextension. Range of motion in the joint following operation was almost normal with some limitation of supination and pronation but it was hoped that ultimately these motions would be regained completely.

One case of gun-shot wound of the elbow with complete loss of all articulating surfaces and triceps and biceps attachments, with resultant flail joint, was operated. Three inches of the distal part of the humerus was missing and the forearm was attached by a thin bridge of scar tissue. Singularly, however, nerve and blood supply were uninjured, and the forearm was sufficiently nourished.

In this case a lateral incision was made on the external aspect of the joint, triceps and biceps isolated and reattached in the forearm. After a few weeks, when these reattached muscles had opportunity to stretch and readjust themselves, the slack in the connective tissue between the bones was taken up, and the wound closed with a fairly normal looking, though somewhat shortened arm, as a result.

After passive motion for a few days, this soldier was able to flex the forearm, but when relaxed, it was as capable as ever, of hyperextension. He was turned over to an appliance maker to have a brace made that would limit extension, but he did not return for further observation. He left the hospital well satisfied with the result of the operation. In this case, amputation might have been considered. There is nothing original in this paper. It is our desire simply to report four cases of elbow-joint injuries that were operated with apparent success, for the information of anyone in the service who may have similar cases under consideration.

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HISTORY OF THE MEDICAL ACTIVITIES OF THE OFFICE OF THE PROVOST MARSHAL GENERAL UNDER THE SELECTIVE SERVICE ACT

By Colonel F. R. KEEFER, M.C.

ALTHOUGH the Selective Service Act was not approved until May 18, 1917, the Provost Marshal General opened his office on April 26, only twenty days after the declaration of war. His staff and equipment were rapidly assembled, and the office was ready to proceed immediately upon the approval of the Act.

The local boards (each composed of three members, one of whom was a physician) whose duty it was to classify registrants as to their fitness and availability for military service, began their work about June 28. Other physician members, in association with voluntary aids, made physical examinations of over 2,500,000 registrants up to December 15, 1917, and between December 15, 1917, and September 11, 1918, there were 3,208,446 examinations, making 5,708,446 in all.

No physician was called to duty in the Provost Marshal General's Office until February 1, 1918. Long before this time, so many questions relating to physical examinations were pouring in, it was obvious that there must be some one available at the headquarters of the Selective Service to answer questions relating to physical examinations, to take care of correspondence, and to advise examining physicians concerning their duties. Doctor Frank Billings of Chicago (recently commissioned Major, Medical Reserve Corps) was therefore assigned to duty as Medical Advisor to the Provost Marshal General, and joined on the date cited.

The benefits of expert medical advice at the source of issue of orders and regulations governing the draft became immediately apparent.

After a few weeks of service, Major Billings was required for important duties elsewhere and gave place to Doctor Hubert Work of Pueblo, Colorado (also temporarily commissioned as Major in the Medical Corps of the Army), who reported for duty March 22, 1918.

The duties and responsibilities incident to the work grew so rapidly that the Provost Marshal General determined to establish a medical division in his office. This was made effective August 2, 1918, upon the arrival of Colonel F. R. Keefer of the Medical Corps, Regular Army.

The medical division increased steadily in personnel and in scope of operations up to the date (November 16, 1918) when medical examinations were officially discontinued.

In the endeavor to meet the situation created by the imperfect understanding, by medical examiners, of the standards of physical examination, and the unsystematic application of those standards, two steps were determined upon by the Provost Marshal General in November, 1917. These were, first, the formation of boards of medical specialists for the reclassification of doubtful cases, and, second, the commissioning of a physician in each state, with his detail as Medical Aide to the Governor of his state. The draft executive in each state was thus to have the assistance of a member of the Medical Reserve Corps, to aid in organizing and making available for the best use of the local and district boards in the matter of classifying and examining registrants, the members of the profession who might be appointed to duty on any board, or who might volunteer their services. The Medical Aide was also to assist in districting his state and in selecting members of medical advisory boards, consisting of the specialists aforementioned.

The Medical Aides were appointed in November, 1917, and were called to Washington for instruction. The organization of the medical advisory boards proceeded more slowly, and the boards did not become fully operative until the spring of 1918.

The organization for the medical work of the draft, as finally determined, was therefore as follows:

(*a*) Medical Division, P. M. G. O.
(*b*) Medical aides to governors.
(*c*) Examining physicians for local boards.
(*d*) Medical advisory boards.
(*e*) Physician members of district boards.

These latter boards did not make examinations, but reviewed and determined appeals from the classification of the local boards.

While not a part of the Selective Service system, it should be known that, on arrival of an accepted registrant (inducted man) at an army camp or other point of mobilization, he was physically reëxamined by medical officers of the Army. A very considerable number (over 8 per cent) of all inducted men who were thought by their local boards to be physically qualified for military service were rejected by army medical officers.

At first the standards of physical examination employed by the examiners were those utilized by the Army in times of peace. When the first edition of the Selective Service Regulations appeared in August, 1917, they embodied a revised standard of physical qualifications, which was prepared by the Surgeon General of the Army at the request of the Provost Marshal General.

From time to time these standards of physical examination have been further modified. The next change occurred in January, 1918.

The publication in which the new standards appeared was known as "Changes in Selective Service Regulations, No. 3." Next, the Manual of Instructions for Medical Advisory Boards was issued in February, 1918. These in turn proved inadequate or insufficiently definite, and were accordingly replaced in June, 1918, by Standards of Physical Examination (P. M. G. O. Form 75). Finally, a second edition of Form 75, containing various modifications, was published in September, 1918. This formed the final, and, it is believed, satisfactory set of physical standards for the requirements of army service.

In all of these manuals, it was aimed to group registrants according to their physical conditions into four classes, namely:

(*a*) Those qualified for general military service.

(*b*) Those qualified for general military service when cured of some remediable defect.

(*c*) Those qualified for special or limited military service.

(*d*) Those unconditionally rejected for all military duty.

The various changes in the physical requirements were necessitated by a variety of factors, some of which have already been mentioned. Primarily, it was aimed to induct into the service only those men who were physically qualified for general military duty of whatever kind. Early in the administration of the Selective Service Act, it was found that there was a need for physically substandard men, and that a considerable reservoir of these existed in Groups B and C. These it was deemed advisable to utilize along the lines of their special training, so that they might relieve for general duty those physically qualified for such service. The latter revisions of physical standards have had the advantage of taking thousands of registrants out of Group B and placing them in either Group A or Group C, thus giving the Government the benefit of their services.

Another feature that was considered in the final revision of physical standards was the necessity which arose for supplying men for the Navy and Marine Corps, through the agency of the draft. The chief points of difference were in the requirements as to vision, skin, and venereal diseases, which requirements were more stringent for Navy service.

At the time when the armistice became effective, there were 4,648 Local Boards and 1,319 Medical Advisory Boards. The machinery of the draft included an approximate total of 25,000 physicians at this time. As the medical personnel was subject to considerable change, it is probable that nearly 40,000 members of the medical profession of the United States were concerned with the operations of the Selective Service at one time or another.

The great influenza epidemic of the fall of 1918, while seriously impeding the work, nevertheless failed to stay the ordinary processes of the draft. So great a reservoir of men already examined had been accumulated, that it was possible to induct and send to camps the hundreds of thousands called for by the General Staff of the Army, under the schedule prepared by it before the incidence of the epidemic.

To convey some idea of the magnitude of the work, the single fact may be stated that 17,000,000 copies of Form 1010 (physical examination blank) were printed in preparation for the registration of September 12, 1918.

During the entire period of physical examination activity (June, 1917, to November, 1918) a total of 3,208,446 registrants were examined and grouped with respect to their physical qualifications.

EDITORIAL

TEMPORA MUTANTUR ET NOS MUTAMUR IN ILLIS

"Times change and we change with them." True enough, from the standpoint of either the pessimist or the optimist. Nothing stands still in this busy world save the "reactionaries" and for all of us save that unhappy class it is either progression or regression.

How very true this is in respect to our own profession of medicine must be more apparent to those of us who have left the amphitheater and the lecture room twenty or more years ago. To those who are rising up to take our places this steady advance must be less apparent than to those who have seen the old order give way to the new and have the realization of personal experience rather than the testimony of records which have already become past history.

How very much has occurred in the past twenty years to change the field and scope of the practice of medicine and surgery! To recount these progresses would be the detailing of things with which we are conversant, and in the main unnecessary. Taken as a matter of course, and as the logical development of a science, these additional improvements in scientific method do not seem quite so startling as they do when we compare, in detail, some of the old order with the new.

Twenty-five years ago we had our specialists to be sure, but what a limited and totally inadequate field they covered when compared to the necessities of diagnosis, prophylaxis and treatment as represented by the requirements of the present time. Surgery, gynecology, obstetrics, the eye, ear, nose and throat, (usually contentedly bracketed together) venereal disease, a little bacteriology, and not much besides. What a meager list when we consider the possibilities of the present times! Furthermore, there has been a change in the personnel of the profession itself, and in the manner of acceptance of its members by the laity. The doctor of the old school was in a class with the clergy, and thus not to be considered in at all the same manner in which he is to-day. It was not good form for him to insist too strenuously that he be paid what was due him: that he should have someone to manage his business affairs was an innovation which was rather shrugged at and accepted as a dubious right for those who by their eminence could decide their own course of conduct. The medical man was not, as he is to-day, a force in state and community affairs. There was no industrial medicine; no expert was summoned by the factory to determine how accident percentages might be lowered. Epidemics ran unchecked as visitations of God and preventive medicine was still in *posse* rather than in *esse*.

What need to look at the other side of the shield? X rays, radium, Wasserman tests and all the rest which has done so much to controvert the somewhat cynical definition of medical practice as "scientific guessing?"

As all these changes crept into the existing order of things, it was no more than natural that the influence should be apparent in the application of medical science to the management of its affairs in the Federal services. This was brought home to us the other day when we looked over the records of a volunteer regiment which served in the Spanish War in Cuba. After the list of field and staff, the long array of the companies, down at the end and under the heading of "The Hospital Corps" appeared the names of the three regimental surgeons, three stewards and modestly beneath, that of the one private who was supervised and directed by this personnel of commissioned and non-commissioned officers. Recollection tells us that there *were* other privates, the number of which, however, is hazy in our mind, and that they were all drafted from the line and had no inherent knowledge of the duties of the care of the sick and wounded. How queer that seems now: and also that there was no ration for the sick man, but that he had to depend on the bacon and beans of his healthy and omnivorous comrades or be fed from the often meager resources of the "hospital fund." No field hospitals, in the real sense of the present time, no ambulance companies, no organized base, nor evacuation hospitals—so pitifully little of anything if we measure the provision of modern times against this appalling shorthandedness of what sounds like the dark ages.

We wonder if when we wrinkle our brows and shake our heads because sometimes now the wheels do not engage and the gears fail to mesh we realize how much further ahead we are than in the days of two decades past. Then, our corps, in relation to others was of relatively small importance and the authority delegated to it much limited. There was no basis for the supposition that we were to become, as we did in the last war, a salvage corps of broken human machinery as well as just a number of doctors. Time had not proven how important a part the medical content of the armed forces was to play in the provision of effective units for the fighting forces. It has been stated that the entire French fighting force was thrice sent to the rear and thrice returned as fit for any duty. This, if it be true, shows the grave responsibility placed by progress on our shoulders and one which is more and more realized by our comrades of the line. What further shall come to our hands to do remains to be demonstrated by the needs of future years but it is very safe to predicate that any advance in the science of our chosen profession will be paralleled by the progress of those who make Military Medicine their special field.

THE INTERALLIED SURGICAL CONFERENCE

The deliberations of this body correlate with what has been expressed in the paragraphs above. In addition to the consideration and discussion of surgical conditions such as the late treatment of fracture of the jaws, methods of skin transplanting, tolerance of organs and tissues for projectiles and like topics included in the eleven questions taken up for discussion at this session, subject XI seems particularly pertinent in view of the opinions we have volunteered in the editorial paragraph which heads these pages. It is as follows:

> Authoritative study of the losses of the Allies; dead and wounded, and results of wounds. Progress in Service de Santé during the war.

The last sentence in this caption is the one which concerns us and we note with interest that after discussion of the question the following resolution was adopted unanimously by the Conference.

> 1. The doctrine of the Medical Service and the reason for the existence of such a service in an army from the military point of view must be considered as the conservation of man power.
>
> 2. No Medical Service can function to maximum efficiency that does not command the confidence of the high command. The war has demonstrated that the Medical Service is worthy of this confidence and it follows, therefore, that the organization of the Great Headquarters in the future must be of such a character as will grant to the Medical Department the greatest freedom in the solution of its particular problems, and ensure the sympathetic coöperation of the General Staff.
>
> 3. It is the consensus of opinion of this conference that the organization adopted early in 1918 in the French Army (whereby a Medical Section of the General Staff was authorized and which demonstrated its value throughout the last year of the war) better meets the requirements than any organization heretofore employed and may well serve as the model for the future.
>
> 4. In order to obtain the highest efficiency of the Army Medical Service in time of war, it is necessary to establish, in time of peace, a permanent course of instruction of specialists in each branch of medicine, particularly in the surgical branches.

The semimonthly *Medico-Military Review*, issued from the office of the Surgeon General of the Army, in commenting on this, says:

> In connection with the above and particularly as concerns the Medical Department of the United States Army, it is of interest to observe that medical officers are now being detailed as students at the Army Service Schools and at the General Staff College. Association at these institutions on a common ground, and with the same objective, augurs much for the future relationship between the Medical Department and other arms and services. This policy will go far toward engendering mutual understanding, and standardized methods, in the solution of the problems of the future.
>
> Under the Army Reorganization Act of June 4, 1920, the special detail of medical officers as additional members of the General Staff of the War Department was authorized. In recently announcing the reorganization and personnel of the General Staff at the War Department the names of two medical officers appear on that list.
>
> While the A. E. F. in France did not authorize a Medical Section of the General

Staff similar to that employed in the French Army it did provide for medical representation on all Sections of the General Staff at General Headquarters, and in certain Sections at Headquarters of the S. O. S.

Because of the peculiar activities it controlled the largest medical representation was concentrated in the Office of the Assistant Chief of Staff of the Fourth Section (G-4) at General Headquarters. Although it remained as a subsection of G-4 throughout the war it gradually became known at General Headquarters and elsewhere as the "Medical Section of the General Staff."

With the trend of the times it is reasonable to assume that in any future war we shall enjoy *at least* this form of representation on, a participation in the activities of, the General Staff, and probably will more nearly approximate the French organization mentioned in the resolution.

ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, September 1, 1920, the following names were proposed and elected to membership in the Association:

Medical Corps, U. S. Army

Majors

Harry Leslie Chambers
R. C. Gill
Henry Wiley Grady
Karl Frederick Kesmodel
Alvah S. McClain
George Andrew Nylund
Lewis D. Remington
Carl William Shaffer
Fenwick G. Taggart
L. M. Van Meter
Clarence W. Way
James Arthur Wilson

Captains

James H. Ashcraft
Fred Bearden
George F. Cahill
Fred R. De Lappe
Julian N. Dow
Joseph H. Fitz
Davis Forster
Howell Beckham Gwin
Fleet H. Harrison
Joseph Max Irwin
George Thomas Jordan
Russell Cleveland Lichtenfels
Desmond Francis McGuire
F. V. Meriwether
William M. Peters
Emerson Sumers Porter
Harold Wilson

First Lieutenants

Edwin Leland Brackney
Frank Leroy Carson
Davis Hunter Coleman
William Guy Eckman
Thomas H. Gilland
Albert Godfrey Gran
John J. Grant
Frank M. Hagans
Andrew J. Loughnan
Samuel Arthur Marsden
Eugene B. Munier
William L. Nutter
Fred Short Ryan
Clarence Easterly Weaver

Medical Reserve Corps, U. S. Army

Lieutenant Colonels

Stephen V. Balderston
John Butler
James A. Duff
Charles Johnstone Imperatori
Charles W. Kollock
John R. Newcomb
Edward D. Sinks
Warner G. Workman

Majors

Edward Johnson Abbott
Paul R. Allyn
Laurie James Arnold
Frederick Barrett
John Allan Bertolet
Frank McH. Beeler
Elvin Otis Brown
James Slater Crawford
Edgar Orrin Crossman
Elmer Llewellyn Dickey
David Earnest Dolloff
James Claude Elsom
Isaac L. Garrison
Archibald Fowler Graham
Robert Eugene Hale
William Hubley Herr
John Hartwell Marable
Nels George Mortensen
John Francis Spearman
John Wallace

Captains

John Geikie Adam
Walter Carter Aylen
Fred Boyd Tapley
William Turner Van Pelt
Henry Herbert Warner
A. S. Wescoat

First Lieutenants

Robert Crow Hamilton
Joseph Searle McDede
Shelby Cullom Shurick

United States Public Health Service

Surgeons

Robert Dwight Brown
Edmond J. Doering
John McMullen
Frederick C. Smith

Passed Assistant Surgeons

Lyman A. Burnside
Thomas S. Roach
Newton E. Wayson

Senior Assistant Surgeon

Emmett Earl Byrd

Assistant Surgeons

Anthony A. S. Giordano
Ralph Chester Williams

Acting Assistant Surgeons

William Louis Dembrow
Mary M. S. Johnstone

Medical Corps, U. S. Navy

Lieutenant

Paul Vernon Tuttle

Medical Corps, U. S. N. R. F.

Commander

Robert Battey Greenough

Lieutenant Commander

Arthur Clayton Sintor, Jr.

Lieutenants

William B. McWilliams
Robert Macfeely Shea

Major, Medical Corps, Minnesota National Guard

Martin Aune

Major, Medical Corps, Philippine National Guard

J. Velasquez DeLeon

First Lieutenant, Medical Corps, Minnesota National Guard

Albert Markley Snell

Major, Medical Corps, Florida National Guard

Guy A. Klock

First Lieutenant, Medical Corps, Rhode Island National Guard

Charles C. Purdum

First Lieutenant, Medical Corps, New York National Guard

L. Howard Moss

Contract Surgeon U. S. Army

Robert J. Talbot

COMMENT AND CRITICISM

War Department,
Office of the Surgeon General,
Washington, September 7, 1920.

The Editor, The Military Surgeon,

Dear Sir:—In an article entitled "History of Overseas Division," published in the August number of The Military Surgeon, the following statement is made on page 182:

Lieut. Col. W. L. Hart was in charge of this division from its inception as a section of the Hospital Division.

Since writing this article I have ascertained that Lieutenant Colonel Hart was not in charge of the division from its inception as a section of the Hospital Division, but that he became chief of the section at a later date. As stated in the same article on page 180, during the early part of the war the organization of Medical Units for overseas service was conducted by various officers on duty in the Office of the Surgeon General. These officers were connected with the Hospital Division of that office.

The necessary correction will be made before this article appears in The Medical and Surgical History of the World War, and I request that this communication be published in the next number of The Military Surgeon.

Very truly yours,
S. J. Morris,
Lieutenant Colonel, Medical Corps.

Headquarters of American Typhus Fever Expedition, United States Army,
Warsaw, *August* 10, 1920.

Memorandum No. 20.

The American Polish Relief Expedition has completed its first year in Poland, the advance guard consisting of the commanding officer, Maj. Lee R. Dunbar, Maj. Willis P. Baker and Maj. Francis M. Fitts of the Medical Corps, United States Army having arrived in Warsaw August 9, 1919. The remaining members of the expedition followed shortly thereafter in charge of railway convoys which they safely guarded across Germany.

The commanding officer looks with pride upon the record made by the expedition and feels greatly pleased with the splendid results achieved.

The members of the expedition not only assembled the vast amount of materials which were purchased from the American Liquidation Board in France for the work in Poland, but they also loaded them on trains and safely convoyed the same across an enemy country to Poland.

In moving these materials thirty-three trains consisting of over 1,700 railway cars were required.

Arriving in Poland the usual difficulties which could be expected in any foreign country were encountered, but these, however, were soon overcome. The members of the Expedition not only supervised the unloading of the trains and the proper storing of the supplies but also took charge of the distribution of them, which was done mostly by motor transportation.

Due to the fact that typhus fever was prevalent all over the country, it became necessary to assign members of the command to all parts of Poland. Some were ordered for duty with the army along the very front lines, others to isolated villages where they were cut off from all forms of direct communication, others were assigned to the various quarantine stations, five detachments each consisting of twenty enlisted men under command of a commissioned officer were in charge of field columns operating in the worst infested parts of Poland, others were assigned to duty with typhus fever hospitals, supervising the construction and the operation of bathing and delousing trains, in general charge of motor repair shops and the repairing of permanent bathing plants.

Wherever the men were assigned they performed their duties to the best of their ability and without complaint.

Although the expedition was ordered to Poland solely for the purpose of fighting typhus fever, its members never hesitated to do whatever they were called upon. Special mention might be made of the very excellent work performed by members of the command during the terrible blizzard which struck Poland in November last. The blizzard came unexpectedly and at a time when the people were least prepared for so sudden a change, as a result untold suffering resulted. Upon request from the Polish authorities for assistance from the expedition every member of the command volunteered for relief work and within a few hours after the call was made over thirty large motor trucks and one tractor engine with trailers, all manned by members of the Expedition, were at work. Notwithstanding the rigid wintry weather with the thermometer hovering in the vicinity of 10° F. below zero and the earth covered with an almost impassable fall of snow, the men worked from early morning until late at night administering help and assistance.

Three members of the command, Lieutenant Colonel Register, Cook Grinstaff and Private Burns gave their lives for Poland. They died performing their duties like true American soldiers and their graves shall be a link in the chain of friendship between the United States and the new Republic of Poland.

Sergeant Cook, who was in command of bathing and delousing train No. 1, which was working in the vicinity of Minsk, refused to desert his train in time of danger; as a result he was captured by the Bolsheviks, put into prison for several weeks, and finally permitted to rejoin the command.

At present all realize that Poland is fighting for her very existence against an enemy of superior numbers. Her lands are gradually disappearing and her peoples driven to distant parts. Here again the members of the command like true American soldiers are doing all in their power to relieve the suffering of these poor refugees. They are supervising the distribution of food to them, taking charge of camps and performing other duties too numerous to mention. In addition the Expedition is assisting the Americans in Poland at this critical hour. Members of the Command are not only convoying property but are acting as guards for the American Legation, the Consulate and different Relief organizations. They are doing their duty to the best of their ability.

The highly successful year just passed in Poland is due to the individual work of each officer and man together with their exprit without which little would have been accomplished.

In conclusion the Commanding Officer wishes to extend to all officers and men of the Expedition his warmest appreciation and sincerest thanks for the loyalty, coöperation and earnest support given by all during the successful year just past, as a result of which the reputation of the Expedition has been the very best. As a proof of this it is most pleasing to know that upon the request of the Polish Government the Expedition has been extended on three different occasions for additional service in the Republic. Although the American Soldier came to Poland a stranger, whereever he has been stationed he is looked upon as a friend to Poland and loved by all.

By order of Lieutenant Colonel Gilchrist:

Alfred N. Bergman,
First Lieutenant, F. A., U. S. A. Adjutant.

QUERY BY COLONEL NICOLL

THE EDITOR, THE MILITARY SURGEON:

I note in the August number of THE MILITARY SURGEON a statement of Lieutenant Colonel J. S. Morris, Medical Corps, U. S. A., to the effect that "They (hospital units) did not operate independently." I wonder if Hospital Unit H, which I had the honor to command, was unique in that it *did* operate independently? This unit was organized at Fordham Hospital, New York City, by the undersigned, in the early part of 1917; was called to active service in December, 1917; trained at Fort McPherson, and sailed overseas February 16, 1918. Unit H proceeded through England and across France, first tasting of the rigors of war when, in the outskirts of Paris, it shared in the air raid of March 11, 1918. Unit H proceeded to Langres, Haute Marne, in the advance section, and took over Camp Hospital No. 24, operating under the surgeon of the advance section. Camp Hospital No. 24 was conducted by Hospital Unit H from March 17, 1918, till the hospital was closed, March 15, 1919. From time to time this unit was added to in the numbers of its enlisted and officer personnel, but the unit remained intact, and the commanding officer of Hospital Unit H was continuously in command of Camp Hospital No. 24. Approximately 6,800 cases of general medical and surgical nature were passed through the hospital while Unit H was in charge.

Unit H spent approximately nineteen months in active service, over sixteen months of this time being spent in foreign service, officers and men being discharged in the latter part of June, 1919.

Very truly yours,
Alexander Nicoll,
Ex-Lieutenant Colonel, Medical Corps, U. S. A.

BOOK REVIEWS

The Principles of Anatomy. As seen in the hand. By Frederic Wood Jones, D.Sc., M.B., B.S., London. Professor of Anatomy in the University of Adelaide; sometime Professor of Anatomy in the University of London, at the School of Medicine for Women; Examiner in Anatomy to the University of London; the Conjoint Board of the Royal Colleges of Physicians and Surgeons, and to the Society of Apothecaries. With 2 plates and 123 text figures. 1920. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street.

This volume is designed primarily for teaching the applied anatomy of the hand to medical students and practitioners of surgery but all students of anatomy, especially artists, will find it useful. The text is well written, the type is large and the text figures carefully prepared. Francis M. Munson.

A Diabetic Manual. For the mutual use of doctor and patient. By Elliot P. Joslin, M.D., Assistant Professor of Medicine, Harvard Medical School; Consulting Physician, Boston City Hospital; Collaborator to the Nutrition Laboratory of the Carnegie Institution of Washington; formerly Lieutenant Colonel, M.C., U. S. Army. Illustrated. Second edition, thoroughly revised. 1919. Philadelphia and New York: Lea and Febiger. Price $1.75.

The early appearance of a second edition of this useful manual is a tribute to its merit. The book has been revised, condensed and simplified and the improvements have kept pace with the advance in our theoretical and practical knowledge of the subject. In the opinion of the reviewer the author has attained his object of making the work a text-book for physicians and a medium for the education of his diabetic patients. Francis M. Munson.

The Duodenal Tube and its Possibilities, By Max Einhorn, M.D., Professor of Medicine at the New York Post-graduate Medical School; Visiting Physician to the Lenox Hill Hospital, New York City. Octavo of 122 pages with 51 illustrations. Philadelphia and London: W. B. Saunders Company. Cloth, $2.50 net.

Professor Einhorn gives in this carefully prepared little volume a brief sketch of the development of the duodenal tube and a résumé of what has thus far been accomplished by means of it. Practical directions are given for its use in diagnostic, therapeutic, and research work. The typographical work is excellent and the illustrations leave nothing to be desired.

Francis M. Munson.

A General Introduction to Psychoanalysis, by Professor Sigmund Freud, LL.D. Authorized Translation with a preface by G. Stanley Hall, President, Clark University. New York: Boni and Liveright.

This volume consists of a series of twenty-eight lectures recently delivered by Professor Freud and is intended for both laymen and students. The language is simple and no previous knowledge of psychology is necessary for its comprehension. The work is divided into three parts bearing the titles "The Psychology of Errors," "The Dream," "General Theory of the Neuroses." A text like this is opportune and the manner of presentation of the subject will tend to popularize the subject. It is a complete exposition of the present status of psychoanalysis. Teachers, lecturers, physicians and students will find it of genuine value.

Francis M. Munson.

PUBLIC HEALTH AND INSURANCE: American Addresses. By Sir Arthur Newsholme, K.C.B., M.D., F.R.C.P., Lecturer on Public Health Administration at the School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Maryland; late Principal Medical Officer of the Local Government Board, England; etc. Baltimore: The Johns Hopkins Press, 1920. Price $2.50.

Medical men, sociologists, and publicists are fortunate in having preserved in book form the interesting and instructive lectures delivered by this distinguished author and public-health worker during his recent visit to America. Ten lectures are included in the volume, and in them Sir Arthur covers most of the important phases of sociologic medicine and public health administration. Among others may be mentioned the increasing socialization of medicine, the medical aspects of insurance against sickness, the inter-relation of various social efforts, some aspects of poverty, some problems of preventive medicine of the immediate future, and public health progress in England during the last fifty years. The subjects are presented in a clear, concise and logical manner and every page contains valuable information and food for thought for thinking people.

FRANCIS M. MUNSON.

REGIONAL ANESTHESIA (Victor Pauchet's Technique), by B. Sherwood-Dunn, M.D., Officier d'Academie; Surgeon (Colonel) Service de Sante Militaire de Paris; Physician to the Cochin Hospital. With 224 figures in the text. Philadelphia: F. A. Davis Company, Publishers.

This book will prove of genuine value to all those engaged in surgical work, whether general surgeons or surgical specialists. The subject under consideration is treated in a careful, logical manner, with great attention to detail. The advantages and disadvantages of regional anesthesia are discussed and the necessary armentarium described, after which the author takes up the various surgical operations by regions. The type is large and clear, the paper excellent and the illustrations all that could be desired.

FRANCIS M. MUNSON.

SYMPTOMS IN THE DIAGNOSIS OF DISEASE, by Hobart Amory Hare, M.D., B.Sc., Professor of Therapeutics and Diagnosis in the Jefferson Medical College of Philadelphia; one time Clinical Professor of the Diseases of Children in the University of Pennsylvania; Commander, U.S.N.R.F.; author of A Text-Book of Practical Therapeutics and A Text-Book of the Practice of Medicine. Eighth Edition, Thoroughly Revised. Illustrated with 195 engravings and 9 plates. Philadelphia and New York: Lea and Febiger, 1920. Price $6.

This well-known textbook needs no introduction to the medical profession. In the eighth edition the distinguished author has followed the same plan pursued in the preceding editions, that of making the work an aid to bedside and office diagnosis. Laboratory methods are omitted from the text and emphasis is laid on symptomology. The illustrations are numerous and of great practical value and the typographical work of a high order.

FRANCIS M. MUNSON.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

The Surgical Clinics of Chicago, August 1920. Vol. 4, No. 4, with 80 illustrations. Published bimonthly. Philadelphia and London: W. B. Saunders Company. Price per year $12.00.

A Short History of Nursing, by Lavinia L. Dock, R.N., Secretary, International Council of Nurses, in collaboration with Isabel Maitland Stewart, A.M., R.N. Assistant Professor, Department of Nursing and Health, Teachers College, Columbia University, New York. New York City: G. P. Putnam's Sons. Price $3.50.

George Miller Sternberg, A Biography, by his wife, Martha L. Sternberg. Cloth, price $5. 232 pages with illustrations. Chicago: American Medical Association, 1920.

THE
MILITARY SURGEON

Vol. XLVII NOVEMBER, 1920 Number 5

WAR WORK OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, NEW YORK

(Temporarily designated by the Surgeon General as United States Army Auxiliary Laboratory and Hospital No. 1, respectively.)

INTRODUCTION

THE various war activities of the Rockefeller Institute have been made possible on the large scale on which they were conducted through the aid of the Rockefeller Foundation, which supplemented the available funds of the Institute in a generous manner. Through the large appropriations made to the Institute by the Foundation for war purposes, the Institute was enabled to undertake certain teaching and other activities which it was in position to conduct with advantage.

The war activities engaged on were, indeed, for the most part outside the precise scope of the normal work of the Institute as designed by its founder and Board of Trustees, and as carried into effect by the Board of Scientific Directors. The Institute was created for the purpose of promoting medical discovery through research. In accordance with the principles on which its work was constituted, it left to other agencies the task of carrying into effect, on a large scale, of any discoveries of practical utility which might be made there. However, the imminence of war with and then later the actual declaration of war against Germany, led the corporation of the Institute to readjust its several kinds of activities, in order to place the facilities of the institution on a war basis.

Fortunately, the Institute had made contributions looking toward the prevention and curative treatment of disease which offered immediate application to some of the medical problems likely to arise in connection with the greatly enlarged personnel of the Army and Navy, and with the inevitable casualties of large training camps and actual warfare. For example, the Institute had worked out curative serums for epidemic meningitis and one of the forms of pneumonia, both of which diseases have always appeared in greater or less force in large military organizations; also, under the support of the Rockefeller Foundation, Dr. Alexis Carrel in conjunction with Dr. H. D. Dakin, the chemist, had perfected at Compiegne, France, a method of treating surgically infected wounds, which had come to have wide applicability in practice. It seemed, therefore, right and proper that the Rockefeller Institute should employ its resources in men and facilities in the service of the Surgeon Generals of the Army and Navy in dealing with their large and important problems.

Moreover, the fact was patent that problems in medicine and allied branches, not yet solved, would call for work of investigation. The several laboratories of the Institute were so equipped in men and materials as to enable it to supplement the various research laboratories at the command of the Government. These resources were placed freely at the disposal of the Surgeon Generals and other governmental agencies, and have been employed on a wide variety of research problems.

Meanwhile, the personnel of the Institute suffered considerable depletion, as a considerable number of the scientific staff insisted on going into active service with the expeditionary force; but a nucleus of the staff was reserved through coöperation with the Government, and indeed even augmented by special consignments made by the Surgeon General of the Army, in order that the particular service which the Institute could render the Government might be carried out.

WAR DEMONSTRATION HOSPITAL

When the war began in August, 1914, Dr. Carrel was in France, spending the summer there, as was his custom. He at once offered himself for service and was assigned to military duty by the French Government. He then devoted himself especially to a study of wound infection which the new conditions of warfare were producing in large numbers of cases. Before long Dr. Carrel was given a small hospital at Compiegne, then very near the German lines, in which to carry forward his studies. It was at this hospital, for which the French Government provided ordinary maintenance and the Rockefeller Foundation the cost of the laboratory equipment and running expenses, that Doctors Carrel and Dakin worked out and perfected the method of antiseptic treatment of wounds which now bears their names.

The War Demonstration Hospital of the Rockefeller Institute was planned as a school in which to teach military surgeons the principles of and art of applying the Carrel-Dakin treatment. The idea of a teaching hospital of this kind was conceived after the diplomatic break with Germany occurred, and before war was actually declared against that country. It was also thought of as a model of a base hospital which might be studied by military authorities in the United States; and hence it was constructed on what was regarded as the best plan for such hospitals as developed on the western front. The hospital was essentially a portable structure, including two wards of twenty-four beds each and all the necessary subsidiary units. The unique feature was a large laboratory for teaching the technique of preparation and standardization of the Dakin solution, for the teaching of the bacteriological control of the wounds, and for research on problems arising out of cases admitted or suggested by the general subject of wound infection.

Staff.—The staff of the War Demonstration Hospital consisted of surgeons assigned by the Surgeon General of the Army for instructional purposes, of French military surgeons lent by the French Sanitary Service, and of bacteriologists and chemists in part assigned by the office of the Surgeon General.

Instruction.—The instruction was given to medical officers of the Army and Navy, to enlisted men in both services, to civil surgeons, and to female nurses of the Red Cross and civil hospitals. The classes were conducted in the wards, the operating room, and in the laboratory; and various devices were used to illustrate and enforce the teaching. The medical officers and others (*e.g.*, chemists and bacteriologists) were taught the principles of the Carrel-Dakin method and required to cover, by personal observation or operation, all the essential points involved in its proper application. They learned to prepare and to titrate the Dakin solution, to make microscopical examinations in the bacteriological laboratory; and to prepare the wound and apply the treatment in the operating room and at the bedside.

The course of instruction for medical officers covered ordinarily a period of two weeks. Two classes were, therefore, conducted each month. At first the patients were civilians suffering from a wide variety of infected wounds. After the American Army had begun active military operations in France and the wounded began to be returned to the United States, the soldiers suffering from infected war wounds displaced the civilians. The first overseas case was received on August 31, 1918. The latter cases were of course more valuable and satisfactory than the former for the purposes for which the hospital was established. The first class reported for instruction on August 2, 1917, and the last class completed its work on March 29, 1919.

A brief statement of the routine of teaching followed is given below. In carrying out this schedule from the clinical side, ward rounds were made, operative and dressing clinics held, lantern slides and motion pictures shown to demonstrate the necessity for an exact method of treating infections and the importance of following the four essential principles of the Carrel-Dakin method mechanical or surgical cleansing, chemical sterilization, bacteriological control, and closure.

1. *Mechanical Cleansing.*—Using careful surgical technique, the surrounding skin is cleansed. In some superficial wounds it is possible to sterilize by mechanical means, scrubbing with neutral soap and water being sufficient at times. In the more highly infected wounds involving the deeper structures, not only the outside must be cleansed, but a thorough, careful surgical operation must be performed. Faulty mechanical cleansing can lead to only one result—continued infection with loss of function, or in many cases, loss of life. It is impossible to teach men surgery and surgical judgment in the brief space of two weeks, but it is possible to emphasize the principles of thorough and careful preparation as to the stages of treatment, if the condition of the patient makes this necessary.

2. *Chemical Sterilization.*—Chemicals cannot, of course, be expected to dissolve out and thus remove foreign bodies such as fragments of shell, clothing, bone, etc. The proper clinical use of the chlorine was demonstrated to the classes, and emphasis laid on the point that in the employment of antiseptics the three cardinal principles of time, concentration, and contact must be observed in all cases.

3. *Control.*—Observation with the eye alone will not tell the true condition of a wound. To assist in this work, two methods are available—the curve of cicatrization and the bacteriological control by means of smears and cultures. The former is intended mainly for scientific purposes and not for everyday clinical use. It indicates what effect an antiseptic or method of treatment is having upon the rate of growth of epithelium. For practical purposes, the bacteriological smear control of the wound is of greater value. If mechanical and chemical sterilization have been carried out properly, the bacterial count will fall. If there is a rise or irregularity, the cause is usually a fault in the mechanical cleansing or in the application of the antiseptic, rather than in the method itself.

4. *Closure.*—After the control has shown the wound to be sterile, it may be safely closed by any surgical procedure, such as a simple suture, fat transplant skin flap, skin graft, or other method suited to the case.

As stated, the first patients admitted were civilians and only after August 31, 1918, were soldiers from overseas received. The total number of cases admitted to the hospital during the period of its active service was 325.

LECTURES AND DEMONSTRATIONS (MAJ. S. J. MELTZER)

Resuscitation.—The lectures on the methods of resuscitation consisted in an experimental demonstration on animals of the efficiency of the method of pharyngeal insufflation. The thorax of etherized and curarized dogs was either transversely split or the walls completely removed, thus exposing lungs and heart to full view of the entire class. Without the aid of artificial respiration the lungs of course collapse and as a consequence the heart slows up. Shortly after the heart stopped beating, pharyngeal insufflation was instituted, which caused immediately the rhythmical distention of the lungs, and the heart recovered, sometimes in less than one minute. The experiment was always a success and made a profound impression upon the classes.

Tetanus.—Regarding the treatment of tetanus, three points were discussed: (1) The removal of the primary cause by proper surgical methods; (2) the neutralization of the free toxin in the blood and the lymph by means of a thorough serum treatment; (3) the treatment of the tetanic manifestations after the toxin was once fixed in the nerve cells and thus was unamenable to the neutralizing action of the antiserum. Here chiefly the treatment by magnesium was indicated. The action of magnesium was demonstrated by actual experiments on tetanic dogs; (1) Animals in a severe and dangerous state of tetanus were relieved and restored to nearly normal within a few minutes by a judicious intravenous injection of magnesium sulphate; (2) in another experiment it was shown that an injudicious administration of the magnesium salt may endanger the animal's life; (3) it was finally shown that tetanic animals which received intentionally too much magnesium and thus were in imminent danger could be saved in a few minutes by an intravenous injection of a normal solution of calcium chloride. There were animals in which after receiving a very large dose of magnesium the respiration was completely abolished and the heart's action could not be felt any more; they were nevertheless resuscitated by means of calcium and with pharyngeal insufflation.

1. It was found by Doctors Taylor and Austin that hypochlorite solutions, even if neutral, have the ability to dissolve necrotic tissue, plasma clot, or exudate and pus cells, whence their power of "clearing" the wound and of more efficient bactericidal action, since the bacteria, otherwise protected by the débris or exudate, are readily exposed to the antiseptic effect of the hypochlorite.

2. The chlorine content of hypochlorite solutions diminishes more rapidly when in contact with necrotic tissue than with intact normal tissue. On the other hand, chloramine-T solutions are not only more stable, but deteriorate a little more rapidly in the presence of necrotic than of normal tissue.

3. Dakin's hypochlorite solution and chloramine-T solutions quickly destroy the exotoxin (Bull) of *B. welchii.*

4. The following antiseptics were tested for poisonous effects on

animals and showed decreasing toxicity in the order given: Eucalyptol. brilliant green, mercurophen, mercuric chloride, chloramine-T, dich, loramine-T, proflavine, hychlorite, Dakin's hypochlorite, javelle water, magnesium hypochlorite, iodine, phenol.

In addition to these main points, subsidiary ones to which some attention was given, were studied. It was found that of the solutions of hypochlorite and allied chlorine compounds available for clinical use, none showed an appreciable solvent action on blood clot. Hence arises the advisability of proper mechanical cleansing and treatment of wounds, in order to remove and prevent blood clots which may harbor bacteria.

The hypochlorite and chloramine-T solutions destroy the toxins of diphtheria and tetanus bacilli, and the venoms of crotalus and naja species of serpents.

Beginning in August, 1918, instruction was given convalescent patients by aides in reconstruction and occupational therapy.

At the request of the Surgeon General of the Army, the courses of instruction for medical officers were continued until April 1, 1919. The last class completed its work on March 29, after which the patients remaining were evacuated as rapidly as possible and the hospital was closed on April 15, 1919.

COURSES IN BACTERIOLOGY AND CLINICAL CHEMISTRY

The rise of bacteriology and clinical chemistry is comparatively recent. Hardly twenty years have elapsed since bacteriologists and chemists were first recognized as valuable adjuncts to the clinical staff of the hospital. It is a far shorter time since they have been recognized as essential to the medical organization for the care of the sick.

The fact was early recognized, once we were at war, that the Surgeon Generals would make heavy demands upon the personnel of the bacteriological and clinical chemical laboratories of the country. It was thought probable that the existing highly trained personnel would prove inadequate to meet the needs. On the other hand, it was believed that the recent general addition of bacteriology and its handmaiden serology to the medical curriculum, and the corresponding improvement in the teaching of chemistry in medical schools, as well as the creation of many diagnostic laboratories in hospitals, would provide a large number of partially trained laboratory workers who could readily and quickly be prepared to carry out, either alone or under supervision, diagnostic work in camp laboratories. Other potential sources of workers were the schools of agriculture in which instruction in bacteriology is given. Hence it was proposed to establish training courses in bacteriology, serology, and (later) medical chemistry for this class of students. The Surgeon Generals approved the project and assigned medical officers and others to the Institute for instruction.

Bacteriology.—The first requisite was a teaching laboratory. In view of what was stated of the nature of the Institute, namely, an institution of pure research for already trained workers, no general instructional laboratory had ever been called for. Fortunately, a new laboratory building of the Institute had been recently occupied and contained a large, undivided, and unoccupied space on a convenient floor which could be utilized. The necessary desks and apparatus were quickly assembled and installed, and the first course of instruction opened on June 25, 1917.

The instruction covered a period of four weeks (28 days), and the course was repeated once a month.[1] At the outcast an arrangement was made for 20 places in the laboratory; later the number was increased to 53.

Eligible persons were accepted from the Army and Navy, and when space was available a few civilians who proposed to enter the services were admitted. Eligibility consisted of previous training in laboratory methods, with special reference to bacteriology and serology (immunology).

The course of instruction was planned to be intensive and strictly practical and to cover a selected set of subjects which it was believed would dominate the demands made on the diagnostic bacteriological laboratory. The work was practical, the student carrying out under the direction of instructors the entire series of operations which he would be called on to perform in the diagnostic laboratory. A series of brief lectures and demonstrations was designed in order to make the object of the various steps clear to the student, and to connect the operation with the present state of our knowledge and to point out to him the readily accessible articles and books for his further guidance.

The schedule which follows represents the subjects taught and the period given to each when the course had been fully developed. In order that the nature and manner of the instruction may be easily apprehended, the plan of instruction in a few of the main subjects will be given in some details:

Chemistry.—The course in clinical chemistry was begun April 1, 1918. At first it included only methods of use in clinical diagnosis, but later it was extended to include also the methods of sanitary chemistry which were most called for in the camps. A regular four-year university course in chemistry was required for entrance, with a few exceptions in the cases of medical officers sent by the Surgeon General. Part of the men had also completed post-graduate courses for higher degrees. Because the students selected were already familiar with general chemical technique, they were able to complete the following course in one month.

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[1] In July, 1918, one week's instruction in surgical bacteriology was added, and in the fall of 1918, one week was set aside for the study of anaerobes. Hence when the classes were discontinued, the instruction covered a period of six weeks.

The course included quantitative and qualitative chemical analysis and microscopic examination of urine; quantitative analysis of blood for the determination of acetone, aceto-acetic acid, nonprotein nitrogen, urea, chlorides, bicarbonate, oxygen, hemoglobin, and sugar; detection of blood in feces; analysis of gastric contents; functional tests of glucose tolerance in diabetes, bicarbonate retention in acidosis, and phenolsufonephthalein test for kidney function; sanitary analysis of water, and qualitative tests for poisonous metals and alkaloids; the preparation and standardization of Dakin's solution.

THERAPEUTIC SERUMS

Reference has been made to the fact that the Rockefeller Institute originally contributed essentially to the perfection of the serums for the treatment of epidemic meningitis and pneumonia. It has also taken a leading part in the preparation of the antidysenteric serum and has recently worked out, for the first time, an anti-*B. welchii* antitoxin.

The Institute had discontinued the preparation of the antimeningococcic serum some years earlier when its value had been proven and the manufacture had been taken over by commercial firms. Unfortunately, these firms were not producing a uniformly reliable product, so that when epidemic meningitis appeared in England among the Canadian, and then English recruits, and even the civil population, almost worthless preparations of the serum seem to have been alone available. The results from the use of these preparations were very disappointing, the fatality of the epidemic was very high, and British physicians, not suspecting the quality of the preparations, concluded that the serum was of no use.

At this juncture the British authorities turned to the Rockefeller Institute and requested supplies of the serum. Fortunately the Rockefeller Foundation was ready to provide funds for the resumption of the manufacture. Newer methods were quickly worked out,[1] through which the time required to immunize horses was greatly diminished.

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[1] Amoss, H. L., and Wollstein, M.: Rapid preparation of antimeningitis serum. *Journ. Exper. Med.*, 1916, xxiii, 403.

In a few months the Institute was again producing considerable quantities of the serum. Almost at once when this preparation began to be used, the whole situation changed for the better until confidence in the serum became reëstablished among English physicians. In due time, under the auspices of the British Medical Research Committee, local supplies of satisfactory quality were produced. During this period the Rockefeller Institute without cost supplied serum to the Army and Navy, and for the civilian population of England, and smaller quantities to France, Belgium, and Italy.

Since epidemic meningitis in an endemic form exists widely in the United States, its introduction into our military camps was a foregone conclusion. Hence with the United States on the brink of war with Germany, it was considered desirable greatly to extend the production of the antimeningococcic serum and to increase also the output of other serums, with the perfection of which the Institute had been so closely identified. Generous appropriations by the Rockefeller Foundation made it possible to do this.

Stable space was the first requisite. Hence commodious, modern stables were quickly erected at the Department of Animal Pathology at Princeton, and a bacteriological unit in charge of Dr. J. H. Brown was developed under Dr. Theobald Smith to control the serum production.

Antimeningococcic Serum.—For the most part the serum produced was polyvalent. In its preparation a considerable number of strains (as many as 51) of meningococcus were employed for inoculation. The actual number of strains varied slightly from time to time due to the loss of strains and the introduction of other strains. Representative strains fresh from the human host were introduced continually in order to maintain wide potency in the serum. These strains included representatives of the normal and parameningococci, differing but slightly in their agglutinative qualities, and then representatives of the intermediate strains between the two main types, in which the agglutinative differences were more marked. Toward the end of the war period this number of strains was materially reduced, and simplifications of this and other kinds[1] were introduced into the manufacture of the serum which considerably diminish the cost and labor incident to the process.

The preparation and distribution of the serum was discontinued on June 15, 1919, after the war was over, and at a time when commercial firms had been producing large quantities of serum preparations which, on the whole, appeared to be of satisfactory quality.

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[1] These points are to be presented in a special publication in due course. They include (*a*) the reduction of the number of strains to 21, which subsequent investigations showed could be still further reduced; (*b*) the use of stock vaccine instead of living cultures; (*c*) beginning the succeeding immunizations immediately after bleeding, thus decreasing the intervals between bleedings: (*d*) by certain improvements in the manner of bleeding and collection to increase the yield of serum.

Antipneumococcus Serum.—The antipneumococcus serum, type I, was worked out in the hospital of the Rockefeller Institute. Up to the time the United States entered the war, the quantities of this kind of serum being produced were sufficient for the needs of the hospital of the Institute and for a few selected hospitals in this country interested in using the new remedy for one of the severe and highly fatal forms of lobar pneumonia.

The production of this serum had already been begun by the New York State and City Departments of Health and by commercial firms. In view of the probability that lobar pneumonia would be more or less severely prevalent in our military establishments, plans were perfected for increasing the output at the Princeton laboratories. Because of circumstances and chiefly because of the active pneumonia service maintained at the hospital of the Rockefeller Institute, in which considerable quantities of the serum were employed, large quantities of the type I serum for therapeutic purposes were not supplied by the Rockefeller Institute to the United States Army and Navy.

On the other hand, not only type I, but also type sera II and III, were produced in considerable quantities for diagnostic, so called "typing" purposes. According to this process, cases of pneumonia due to pneumococcus are differentiated according as they are incited by pneumococcus type I, II, or III, or one of the more miscellaneous pneumococci assembled under the designation type IV. No therapeutically satisfactory serum has been produced for the so-called types II, III, and IV pneumonia. Hence it is essentially unscientific to treat cases of lobar pneumonia with so-called polyvalent serum. The clinical evidence, on the other hand, supports the value of an effective type I serum.

The titration of the type I serum is made by protection tests on mice. White mice are given intraperitoneally varying doses of pneumococci, and at the same time a fixed quantity of immune serum. Animals surviving for five days are considered as being effectively protected. All animals, except the virulence controls, receive 0.2 cc., of immune serum intraperitoneally. Serum of type I in quantities of 0.2 cc. uniformly protects against 0.1 cc. of a broth culture of the homologous organism, which kills regularly in doses of 0.000001 cc. This measure of the protective power of type I antipneumococcus serum has been adopted as the standard of potency of serum for therapeutic use.

The therapeutic type I serum is prepared in the horse by injecting the animal intravenously with gradually increasing doses of killed and finally highly virulent cultures of pneumococcus type I. An immune serum produced in this manner is found to possess a specific action against all organisms of type I. This serum is also applicable for typing pneumococcus I. The diagnostic or typing sera II and III are prepared in the horse in the same manner.

In order to apply serum treatment in any individual case, it is essential to have a method of determining very promptly after the patient comes under observation, the type of organism concerned. This may be done by injecting into the abdominal cavity of a mouse a portion of sputum coughed up from the lung of the patient. After sufficient growth has occurred, usually in from six to eight hours, the mouse is killed, the abdominal cavity washed out, and the blood cells and fibrin thrown out by slow centrifugation. In this manner a suspension of organisms is obtained, and the agglutination test can be carried out immediately. If mice are not available, a rapid culture method has been devised whereby growth of the organism from sputum is greatly facilitated by the use of a special medium. In addition to the special technique developed for the determination of types of pneumococcus in sputum, cultures of the organisms from the blood-from spinal fluids, or exudate of empyema, may be typed by the use of the agglutination reaction, or the precipitin test.

As already indicated, soldiers suffering from pneumonia were admitted to the hospital of the Rockefeller Institute for treatment to as great an extent as the facilities permitted. In addition, the Surgeon General of the Army assigned medical officers to the hospital, where they were taught the methods of pneumonia diagnosis and treatment as perfected there. These officers lived in the hospital and served as internes; they remained for a period of six weeks to several months. After leaving the hospital, in many instances they served in the pneumonia wards of camp hospitals. The total number of medical officers assigned to this duty was 26.

Antidysenteric Serum.—The demands for this therapeutic serum were not large. They first came from France in the early period of the war and before the Rockefeller Institute had resumed the production of this serum. For therapeutic purposes a polyvalent serum was produced by inoculating cultures of *B. dysenteriae*, Shiga, Flexner, Y, and Strong. The rapid method[1] of immunization was employed also in the production of this serum.

The polyvalent antidysenteric serum was used also for the identification of dysentery bacilli by the agglutination test, for which it was supplied to camp and private laboratories.

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[1] Flexner, S., and Amoss, H. L.: Rapid production of antidysenteric serum. *Jour. Exper. Med.*, 1915, xxi, 515

During the period of production of the antidysenteric serum, an experimental study was conducted on the nature of the toxin of the Shiga bacillus. This toxin, as present in cultures or extracted from the bacilli, was determined by Olitsky and Kligler[1] not to be a simple substance, but to be composed of two poisons. These two poisons could be separated experimentally and were found to consist of the exotoxin, which has an affinity chiefly for the nervous system and is neutralizable in multiple proportion by its corresponding antitoxin, and the endotoxin whose affinity is for the enteric system, and cannot be neutralized by its antiserum in multiple proportion.

Anti-B. welchii serum.—Caseous gangrene became a very serious form of war-wound infection. Until late in the war period, gaseous gangrene was viewed chiefly as an infection with *B. welchii;* later the very important fact emerged that a variety of anaerobic bacilli of the soil was responsible for and often coöperated in producing this condition. On account of this consideration, the wide applicability which it was hoped that the anti-*B. welchii* serum would have both as a preventive of and treatment for gaseous gangrene, was not realized. Nevertheless, the fundamental studies of Bull[2] on the exotoxin of *B. welchii* remain a milestone in the unraveling of the pathology of gaseous gangrene and contributed essentially to the perfection, toward the end of the war, of a polyvalent prophylactic and curative serum, covering the anaerobic, gangrene producing bacilli responsible for the several varieties of gaseous gangrene of infected war wounds.

The story of Major Bull's work is briefly as follows. Dr. Carrel suggested that an accomplished bacteriologist from the United States be sent him at Compiegne to study especially *B. welchii.* It happened that Dr. J. P. Simonds, of Harvard Medical School, now of Northwestern University, had made a special study of that group of bacilli, which had been published as one of its monographs by the Rockefeller Institute. Dr. Simonds consented to go to France on the mission indicated, and during the several months he was abroad he made interesting and valuable observations on the *B. welchii* bacteria.[3]

Dr. Simonds brought back to the United States with him several cultures of *B. welchii* obtained from war wounds. They were left at the Institute and were turned over to Dr. Bull for study. The starting point of the investigation planned was Lieutenant Colonel Flexner's observation, made many years earlier in the pathologic laboratory of the Johns Hopkins University, that *B. welchii* acts on the muscle tissues of pigeons in a manner practically identical with its effects on those tissues of man. The action is, however, very much more rapid; within a few hours after inoculation gas is produced, the muscles become softened and disintegrated, and the death of the animal takes place.

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[1] To appear in a special publication in due time.

[2] Bull, C. G., and Pritchett, I. W.: Identity of the toxins of different strains of *Bacillus welchii* and factors influencing their production *in vitro.* *Jour. Exper. Med.,* 1917, xxvi, 867.

[3] Simonds, J. P.: Studies on *Bacillus welehii* with special reference to gas gangrene. *Jour. Exper. Med.,* 1917, xxv, 819.

Bull, C. G., and Pritchett, I. W.: Toxin and antitoxin of and protective inoculation against *Bacillus welchii.* *Jour. Exper. Med.,* 1917, xxvi, 119.

Bull, C. G.: The prophylactic and therapeutic properties of the antitoxin for *Bacillus welchii.* *Jour. Exper. Med.,* 1917, xxvi, 603.

Starting from this point, Major Bull found that the bacillus elaborated, in the course of its multiplication in broth containing sterile muscle, a toxin which is highly poisonous. The toxin induces necrosis of muscle but liberates no gas, and on immunization yields an effective antitoxin. With this antitoxin the toxin is neutralized in test tubes and the animal body. The toxin and antitoxin unite in multiple proportion, and the former partakes of the properties of a true exotoxin.

Horses have been immunized with the toxin and made to yield antitoxin of high neutralization value or titre. With this antitoxin a number of cases of gas gangrene, arising in industrial accidents, etc., have been treated successfully. Considerable quantities of the serum were sent to France. Its employment was more or less disappointing, for the reason stated above, namely, that gas gangrene is rarely a mono-infection with *B. welchii*, but usually a poly-infection with several distinct anaerobic bacilli. The other important anaerobes found in infected wounds are: *Vibrion septique*, *B. sporogenes*, *oedemations*, *bellonensis*, *histolyticus*, *totani*, *putrificus*, *fallax*. A number of other unidentified anaerobes have also been isolated. The mere control, therefore, of intoxication by *B. welchii*, and even the suppression in the wound of that bacillus, are inadequate. However, in producing a polyvalent antigas gangrene serum, the method of securing the toxin discovered by Bull is employed with the other anaerobes for which a polyvalent antitoxic serum giving promising clinical results had been produced toward the end of the war. A few months before the armistice, Major Bull was ordered back to the Rockefeller Institute, in order to work out commercial methods of producing the polyvalent serum, on which subject he was engaged at the time of the cessation of hostilities.

Undoubtedly, the results of this work will be carried into civil medicine, and it is important to know that a doubly prophylactic serum for tetanus and *B. welchii* gangrene can be produced readily in the horse by spaced inoculations of the exotoxins of *B. teani* and *B. welchii*.

PROTECTIVE INOCULATIONS

The problem of the prevention of epidemic or severely prevailing infective diseases under military conditions and in camp life is, of course, a very serious one. The approach to this problem, in view of the many complicated circumstances of military organization, is many-sided. Besides the imposition of the ordinary sanitary regulations, the degree of success in maintaining a low morbidity incidence is determined in part by the vigilance of regimental surgeons in detecting early cases of those diseases, the infective agents of which tend to be spread by personal contact.

Everyone knows, thanks to Col. F. F. Russell's excellent work on vaccination in typhoid fever, that the incidence of that disease by this method can be brought almost to the vanishing point. Hence the menace of the chronic carrier of the typhoid bacillus can be abolished practically, along with that of other sources of the typhoid bacillus.

The sources of infection in such diseases as epidemic meningitis and lobar pneumonia may be regarded, for all practical purposes, to be personal, and the mode of infection always to be via the respiratory mucous membranes. In these two diseases, the inciting microörganisms —meningococcus and pneumococcus—are contained within the secretions of the nasopharynx of cases of epidemic meningitis and lobar pneumonia, of chronic carriers who have passed through attacks of those diseases, and of healthy carriers of the respective microörganisms.

Under circumstances of camp organization, protection has been sought first through early hospitalization of cases, next according to the disease (meningitis) by the detection and abstraction of carriers, and third by the inoculation of killed cultures of the several inciting bacteria in an effort to prevent infection through a process of active immunization.

Epidemic Meningitis.—What the attempt at carrier detection and extraction accomplished is dealt with in the reports of others. In this place will be described briefly an attempt made to prevent meningococcus meningitis by the inoculation of killed cultures, that is, by so-called vaccination.

The observation has repeatedly been made that chronic carriers of the meningococcus themselves rarely become ill with meningitis. Hence another factor besides the presence of the meningococcus in large numbers in the nasopharynx and over long periods of time, is required in order that infection of the meninges may occur.

Among other conditions there existed the possibility that these chronic carriers might contain in their blood demonstrable quantities of immune bodies for the meningococcus. And as a matter of fact, Lieut. F. L. Gates,[1] who carried out the study on antimeningitis vaccination, actually demonstrated agglutinins in the blood of chronic carriers of that microörganism.

Now, one effect of the inoculation of killed cultures is to lead to the production of immune bodies for the meningococci which appear in the blood. If, therefore, there exists any relation between this factor and protection from meningococcus infection of the meninges, the vaccination procedure should be effective in many instances.

The study on the effects of vaccination with the meningococcus was carried out at Camp Funston by Lieutenant Gates, following an outbreak of epidemic meningitis at the camp which prevailed during the months of October and November, 1917. The details of the study are given in the special paper already published. A summary of the results only will be given here:

1. A meningococcus vaccine, representing normal and para types of the microörganism, prepared with salt solution, was given to 3,700 volunteers in three injections of 2,000, 4,000, and 4,000 to 8,000 million cocci at weekly intervals.
2. These doses rarely caused more than the mildest local and general reactions. Exceptionally a more severe reaction emphasized the presence of an unusual individual susceptibility to the vaccine. In such instances the symptoms were in part those of meningeal irritation and sometimes simulated the onset of meningitis.
3. Specific meningococcus agglutinins have been demonstrated in the blood serum of vaccinated men, as compared with normal controls.

Whether or not the vaccination procedure gave the vaccinated men any degree of protection over that enjoyed by the noninoculated, could only be determined by a comparison of the incidence of epidemic meningitis among them and among a group of like size similarly situated. Probably the numbers involved would in any case be too small to give a decisive result, and very likely the military disposition of the vaccinated men will make it impracticable to obtain really adequate records or make fair comparisons. The essential point of this study is that inoculation with killed meningococci is easily practicable and is followed promptly by the appearance of antibodies for that microörganism in the blood; and similar antibodies are detectable in the blood of chronic healthy carriers of the meningococcus who have long escaped infection of the meninges.

Lobar Pneumonia.—That the incidence of lobar pneumonia may be reduced by protective inoculations of killed type cultures of the pneumococcus was shown clearly by Lister in South Africa. As pneumonia claims so high a percentage of the deaths from disease in camp life, an effort to reduce the morbidity incidence by vaccination was undertaken by Capt. J. H. Austin, of the Rockefeller Institute, in conjunction with Maj. R. L. Cecil, of the Medical Reserve Corps, in the spring of 1918. The inoculations were carried out at Camp Upton on 12,519 men. A full report of the work has already been published,[1] and in this place a summary only will be given.

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[1] Gates, F. L.: A report on antimeningitis vaccination and observations on agglutinins in the blood on chronic meningococcus carriers. *Jour. Exper. Med.*, 1918, xxviii, 449.

1. At Camp Upton 12,519 men have been vaccinated against pneumococcus types I, II, and III. Three or four doses were given at intervals of 5 to 7 days, with a total dosage of 6 to 9 billions of types I and II and 4½ to 6 billions of type III.
2. In subcutaneous administration the manner in which the total dosage is divided, whether given in a single large dose, in 7 small daily doses, or in 3 to 5 moderate doses at 3 to 7 day intervals, seems to have little influence upon the degree of immune response. provided the total dosage is the same.
3. The degree of response to the vaccination appears to depend upon the total dosage of each type of pneumococcus administered. While some response may be elicited by 2½ billions of cocci of each type, a much more constant and greater response follows 13 billions.
4. Small sterile infiltrations disappearing spontaneously occasionally follow the injections of large doses of pneumococcus vaccine and appear to be an expression of cutaneous hypersusceptibility. The persons who develop these lesions exhibit local reactions to each dose of vaccine. They also give abnormally marked reactions to intradermal injections of pneumotoxin. They do not, however, exhibit anything notable in the agglutinative or protective power of the sera after vaccination. Whereas the immune response is characteristically specific for the type of pneumococcus, this reaction is not specific for any type. No evidence was found that type III is more prone to elicit these severe local reactions than types I and II.
5. Prophylactic vaccination against pneumococcus of types I, II, and III is practical and apparently gives protection against pneumonia produced by these types. It remains to be determined how long this immunity persists.

Bacillary Dysentery.—Under circumstances of wide prevalence of bacillary dysentery, it would appear that analogy with the mode of infection in typhoid fever should subject this condition to control by means of prophylactic vaccination. Hence a study was begun of the possible value of an oily suspension of the killed dysenteric bacilli for this purpose, following employment by Le Moignic and Pinoy of oily suspensions of typhoid and paratyphoid bacilli. It happens that the study along similar lines at the laboratory of the Army Medical School by Col. E. R. Whitmore and his associates anticipated our results; but as Lieut. P. K. Olitsky's study was made independently and covers certain points not dealt with in Colonel Whitmore's publication, a brief summary of Lieut. Olitsky's[2] results is appended.

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[1] Cecil, R. L., and Austin, J. H.: Results of prophylactic inoculation against pneumococcus in 12,519 men. *Jour. Exper. Med.*, 1918, xxviii, 19.

[2] Olitsky, P. K.: An experimental study of vaccination against *Bacilli dysenteriae*. *Jour. Exper. Med.*, 1918, xxviii, 69.

The purpose of the investigation was to determine a practical method of vaccination against bacillary dysentery.

It has been emphasized that the toxicity of the dysentery group of organisms, especially that of the Shiga bacillus, is such as not to permit of their employment in simple saline or aqueous suspensions. If, on the other hand, their toxicity is removed by the addition of certain chemicals, the antigen of the bacilli is so changed as not to be suitable for immunization purposes.

The toxicity of the bacilli can also be diminished by the addition of immune serum. There is no essential difference in the result whether unmodified serum is used or that modified by Gibson's method. The use of serum with vaccines cannot be recommended, in spite of the relative nontoxicity of such mixtures. The specific immunity response is reduced, while the parenteral injection of horse serum in large groups of men is objectionable because of the serum sensitization which it produces.

It has been shown that a certain vegetable oil, almond oil (and this statement may apply to a number of nonirritating, absorbable oils), is capable of overcoming many of these disadvantages.

The oil acts as a passive agent in merely suspending the bacteria without altering their properties. The slow absorption of the suspended bacteria from this vehicle mitigates the toxic effects of the dysentery bacilli. At the same time it does not interfere with the immunity response—antibacterial and antitoxic.

If the absorption is too slow, however, as in the instances in which lanolin was added, less satisfactory results follow. The proper rate of absorption is as important a factor as the proper vegetable oil. The latter condition has been emphasized in the consideration of the effects of an objectionable olive oil.

The neutralization of the oil should be complete. Two volunteers, F.G.S. and J.W.S., suffered from severe local reactions, the results of the local deposition of soaps, which are difficult of absorption.

As a result of the slow absorption of the dysentery bacilli from the oily suspension, only slight local and general reactions follow, and it is possible to give at one time and in a single dose a sufficient number of the killed dysentery bacilli to incite a high degree of immunity.

The precise series of events following the injection of the oily vaccine are: During the first day, an erythematous area develops at the site of injection, which is not especially painful. There may be a slight systemic reaction, consisting in headache and slight chilliness. After 24, sometimes after 48 hours, an induration appears at the site of injection, varying from 2 to 4 cm. in diameter, which remains unchanged for a few days, then begins to recede, complete absorption requiring from one to three weeks. The induration remains localized and has no tendency to break down. It causes no inconvenience.

During the period of absorption the organism of the host continually receives antigen. The rule of immunology is that while antigen is circulating the antibodies are usually not demonstrable; it is only after all the antigen disappears that the antibodies appear in greatest concentration. Since the vaccine is slowly absorbed, the reasons for the delayed appearance of antibodies, as well as their persistence, become obvious.

This study seems to emphasize the advantages of a bland oily medium for suspending dysentery bacilli for purposes of active immunization or vaccination. The experiments on animals and a small number of tests on man indicate that the single injection of an almond oil suspension of the Shiga and Flexner groups of dysentery bacilli suffices to afford protection, as indicated by the appearance in the blood of definite specific antibodies for each group of the bacilli, and by the protection of animals from otherwise lethal doses of the living organisms or their toxic products. The extent to which vaccination should be applied to man will depend on circumstances and conditions still to be defined, but the method appears to be wholly practicable.

TREATMENT OF CHRONIC MENINGOCOCCUS CARRIERS

The question of the disposition of the chronic meningococcus carrier, in military life, is a very difficult one when the carrier state persists, as it sometimes does for many months. In the course of the war a number of such persistent carriers were received into the Hospital of the Rockefeller Institute from the Army and Navy.

In all, 1 naval officer, 12 enlisted men of the Navy, 1 army officer, and 10 enlisted men of the Army were treated. The enlisted men from the Army with one exception had been treated for three months with sprays of dichloramine-T in oil every two or three hours during the time, in spite of which the cultures remained positive. They may be classified, then, as chronic carriers.

On admission, cultures were taken through nose and throat, and local examinations were carried out through the generous coöperation of Dr. Cornelius G. Coakley and Dr. James W. Babcock[1] (later First Lieutenant, Medical Corps, U. S. Army). In all but two, the tonsils were found to be enlarged and in four of them there was an excess of lymphoid tissue in the posterior pharynx. The tonsils and adenoids were removed in seven cases; one in which the operation was advised refused operation. After recovery from operation, the men were exposed to an atmosphere containing chloramine-T in steam in a specially constructed chamber modeled after the English plan.[1] Into this chamber, the cubic capacity of which is 524 cubic feet, there was injected by means of a steam atomizer 800 cc. of a 2 per cent solution of chloramine-T during a period of 40 minutes, three times per day. The men were instructed to breathe in such a manner as to force the vapors high into the vault of the pharynx. After 7 days, only two treatments were given daily and 14 days thereafter once per day. The treatment was discontinued when cultures became negative. The men were discharged from the hospital after five negative cultures at three-day intervals. The last patient was discharged 7 weeks after admission. The cultures were taken from these men at U. S. General Hospital No. 1 two months later, and all but one were negative. The man who refused tonsillectomy had become positive.

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[1] A report of the treatment of these chronic carriers has been made by Dr. Babcock, and appeared in the *Laryngoscope*, 1919, xxix, No. 8.

It was necessary to remove tonsils and adenoids in 8 out of 12 enlisted men of the Navy, and the antrum was drained in two others. Five became negative and were discharged after treatment during one month, 12 more became negative in 6 weeks, three others after three months. Of the 12, two remained positive carriers in spite of treatment although one of these men developed a peculiar hypersensitiveness to the chloramines and treatment was discontinued. This reaction following treatment was observed also in one of the officers supervising the treatments and in a naval officer who was a carrier.

A naval officer was found to be a carrier in the course of an investigation as to the probable source of infection in his wife who became ill with meningitis about one week after his arrival from overseas. The officer was found to harbor a meningococcus corresponding in agglutination reaction to the spinal strain cultivated from his wife. The wife, having been delivered five weeks before had seen only the physician and nurse, so that it is most probable that the infection was brought to her by her husband.

The officer was treated intensively with chloramine for 6 weeks and becoming hypersensitive the treatment was discontinued. He continued to harbor large numbers of meningococci, and was advised to live out of doors for a period, for which purpose he spent several weeks in Florida without effect on his carrier state. A tonsillectomy was performed after which and for the first time a negative culture was obtained.

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[1] Gordon, M. H., and Flack, Martin: Investigations concerning the disinfection of carriers of the meningococcus. *Med. Research Comm.*, Special Report Series No. 3, p. 77.

The last case treated was an Army officer in whom a meningococcus of the irregular type was found; fourteen months earlier two positive cultures are said to have been obtained. No treatment was given him and he went overseas. On his return, having found him to be a carrier, treatment was begun and he became negative after 8 exposures to the chloramine-T vapors, and has remained negative.

Of 23 carriers, 20 cleared up and were discharged free of meningococci in the nasopharynx.

SYPHILIS

The division of chemotherapy[1] of the Rockefeller Institute has been engaged for several years in the study of the chemical therapeutics of the spirochetal and trypanosomal infections. In the course of the studies being made in the division, several new arsenical drugs were devised, which proved to possess more or less marked antisyphilitic action. Certain of these drugs, after an extensive and intensive test on the experimental syphilis of the rabbit, have been tested on cases of syphilis in man. In particular one drug, *p*-Arsenophenylglycinebis-*m*-hydroxyanilide, has now been administered to a considerable number of cases of active syphilis, and while the probation period has not yet been concluded, the preparation has been shown to possess marked antisyphilitic properties.

Among the cases treated were 124 cases of syphilis sent to the hospital of the Institute from the Army and Navy. Of these 44 left, for military or other reasons not connected with the treatment; and 11 cases of syphilis of the central nervous system did not receive a complete course of treatment. Of the remaining 69 cases receiving more prolonged treatment, the superficial lesions disappeared in all and the Wassermann reaction became negative in 66. In the remaining three cases the treatment was interrupted for clinical reasons. A full report of the cases is to be published in due time.

PHARMACOLOGY OF POISON GAS

A pharmacological study of two poison gases, dimethylsulphate and chlorpicrin, was undertaken by Maj. John Auer. The results obtained follow in brief:

1. *Generalized Analgesia.*—Cats which have been gassed with dimethylsulphate or chlorpicrin develop a general reduction and even loss of pain perception; severe operations, including laparotomy, may be carried out with little or no signs of suffering.

This analgesia develops within an hour after gassing, at a time when the cats are in good condition as indicated by blood pressure, pulse and respiration.

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[1] This division consists on the chemical side of Dr. W. A. Jacobs and Lieut. Michael Heidelberger; and on the experimental, pathological side of Dr. W. H. Brown and Dr. Louise Pearce.

The reduction or loss of pain perception may persist for weeks; this is especially noticeable in cats gassed with dimethylsulphate.

The cause is not definitely established but appears to be related to a low-grade, general, persistent asphyxia of the body tissues.

2. *Causation of Pulmonary Edema in Cats Gassed with Dimethylsulphate.*—A local marked pulmonary edema involving only a portion of a lobe may be frequently observed. An important factor in its production is the partial or complete stenosis of a bronchiole due to the inflammatory reaction of the mucosa. As air passes through the stenosed bronchioles only with difficulty or not at all, each alveolus supplied by a stenosed bronchiole must act as a miniature cupping apparatus during each inspiration. The suction thus exerted during each inspiration by each alveolus must draw fluid from the capillaries in the alveolar wall into the aveoli, thus aiding or initiating the production of pulmonary edema.

3. *Causation of Pulmonary Edema in Cats Gassed with Chlorpicrin.*—In order to determine whether the heart played a rôle in the production of the extensive pulmonary edema caused by this gas, the animals were examined electrocardiographically both during and after gassing; three leads were employed.

A number of interesting alterations were observed, but the data have not yet been analyzed in sufficient detail to permit a statement.

CHEMICAL PROBLEMS

The chemical laboratory of the Rockefeller Institute, in charge of Dr. P. A. Levene, undertook several pieces of work at the request of the Surgeon General of the Army, the Chemical Warfare Service, and the Aviation Service of the Public Health Service. In the first place, the chemical laboratory coöperated with Captain Northrop in his studies on acetone production by bacterial fermentation.

Another line of investigation on acetone formation from propyl alcohol by catalysis, using brass as catalyst, was conducted by Dr. G. H. Meyer and Mr. E. P. Clark. Since it was found that the yield of acetone depended on the conditions, namely on temperature and rate of distillation, the optimum of the conditions was established.

Barbitol and Adolin.—At the request of the chemical service of the Council of National Defense, the conditions of manufacture of these two drugs were worked out by Mr. F. A. Taylor, and the methods employed in the laboratory for their production of barbitol (veronal) was taught at the request of Dr. J. Stiaglitz of the Committee on Synthetic

Drugs of the Council of National Defense, to the Rector Chemical Company.

Antidote to Mustard Gas.—The Chemical Warfare Service invited suggestions of organic bases to be used in neutralizing the hydrochloric acid in the tissues supposed to be liberated there after mustard gas poisoning. The employment of acid amides was proposed and several such amides were prepared and submitted for testing.

Vermin Proofing of Furs.—The Aviation Service requested assistance in the employment of dyes for furs used in aviation garments, which should diminish vermin infection and at the same time be nonirritating to the skin. A number of dyes were recommended for the purpose, and samples of fur dyed in the laboratory were submitted to the service for trial.

Preparation of Rare Sugars.—The demand for the rarer sugars for bacteriological purposes was met, at the request of the Surgeon General, by their preparation by Mr. E. P. Clark. The greater part of the supply produced was used in connection with the bacteriological courses to officers in the service, given in the laboratories of the Rockefeller Institute.

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THE CASTLE-MITCHELL ROSTER OF MEDICAL CADETS IN THE UNITED STATES ARMY (1861-1865)[1]

By Lieut. Col. FIELDING H. GARRISON,
Medical Corps, U. S. Army

COLONEL McCULLOCH, the Librarian of the Surgeon General's Office, has asked me to present to this Association a note on the list of medical cadets in service in the United States Army during the Civil War, which was compiled by the late Dr. S. Weir Mitchell, and presented in typewritten form, to the Library of the College of Physicians of Philadelphia, shortly before his death. Through the courtesy of Mr. Charles Perry Fisher, Librarian of the College of Physicians, a typewritten copy of this list was obtained for the Surgeon General's Library, and our object in presenting it on this occasion is to secure a permanent reprint of this valuable record in the official organ of the Association.

The probable incentive for the task which Dr. Mitchell set himself in making this compilation is to be found in the fact that his own brother, Edward Kearsley Mitchell, was a medical cadet and during his last illness was attended in hospital by the late Dr. John S. Billings. This was the beginning of the lifelong friendship between Dr. Mitchell and Dr. Billings, who, in their close old age, were as David and Jonathan. As Dr. Mitchell himself said:

> My own personal relations with John Billings began in the Civil War, when he had for a time the care of my brother, a medical cadet, during a mortal illness contracted in the Douglas Hospital, Washington. I saw then how gentle-minded was this man and how he realized the pathetic disappointment of a highly gifted young life consciously drifting deathward. I saw thus a side of John Billings he rarely revealed in its fullness.

The roster prepared by Dr. Mitchell was by no means the first to be attempted. He was preceded by Dr. Frederick Augustus Castle

Note.—Aside from the intrinsic interest of Colonel Garrison's article there is an additional interest due to the fact that the Corps of Medical Cadets, the history of which he traces for us, was in reality the base on which was built our existing Medical Reserve Corps. The late Surgeon General R. M. O'Reilly served as a member of this Cadet Corps during the Civil War and it was due to his initiative and effort during the time that he was Surgeon General of the Army that the Reserve Corps was established. There is no doubt that his service as a Cadet impressed him with the necessity of provision in time of peace for the almost inevitable inadequacy of personnel in the Medical Corps in time of war and suggested to him this measure of preparedness which should in time of armed conflict render available a number of men so trained that they could take up the duties of the regular Corps and serve as a very useful nucleus around which should be built, by intensive training and study the additional number to meet the emergency.—The Editor.

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[1] Read before the Association of Military Surgeons at the Washington meeting, September 13, 1915.

[1842–1902], of New York, who was a medical cadet in 1862–63, afterwards serving as acting assistant surgeon, United States Navy, 1863–1865, and prominent in New York City, as editor of *New Remedies*, the *American Druggist*, lecturer on pharmacology at Bellevue, and one of the committee for revision of the Sixth and Seventh U. S. Pharmacopœias. In 1899, the year after the Spanish-American War, Dr. Castle attempted to draw up such a list from the records in the War Department, designing to have it published, either at government expense or by subscriptions from surviving medical cadets who might have been interested in the project. It does not appear that this plan ever came to anything, as Dr. Castle's records, consisting of a mass of loose MS., a careful alphabetical tabulation of the military records of the different cadets, and an album containing a few of Brady's *carte de visite* photographs of the period, was finally deposited by him in the Surgeon General's Library. Dr. Mitchell's list (subjoined) is practically identical with Dr. Castle's, exceeding it by one additional name, that of E. T. Weisel. The additional details as to the military records of the individual names, which is the feature of the Castle list, can be consulted at any time in the Surgeon General's Library.

It now remains to give some account of the history and significance of this corps of medical cadets. On account of the deficiency in medical officers at the outbreak of the Civil War, Congress passed, on August 3, 1861, "An act providing for the better organization of the military establishment," section 5 of which reads as follows:

> *And be it further enacted*, That there be added to the Medical Staff of the army a corps of medical cadets, whose duty it shall be to act as dressers in the general hospitals and as ambulance attendants in the field, under the direction and control of the medical officers alone. They shall have the same rank and pay as the military cadets at West Point. Their number shall be regulated by the exigencies of the service, at no time to exceed fifty. It shall be composed of young men of liberal education, students of medicine, between the ages of eighteen and twenty-three. who have been reading medicine for two years and have attended at least one course of lectures in a medical college. They shall enlist for one year and be subject to the rules and articles of war. On the fifteenth day of their last month of service, the near approach of their discharge shall be reported to the Surgeon General, in order if desired, that they may be relieved by another detail of applicants.

The medical cadets were thus noncommissioned officers, enlisted for one year, at the pay of West Point cadets ($30 a month), but wearing the uniform and insignia of commissioned officers, and entitled to their social and mess privileges. Although they were usually medical undergraduates, their duties, Castle claims, were practically those of acting assistant surgeons. As being noncommissioned officers, their names were never listed in the official *Army Register*. The medical and military status of the medical cadets was thus as vague and undeterminate as that of the Russian *Feldschers.* As to their efficiency, Surgeon General Finley, in his annual report to the Secretary of War, speaks as follows:

> They have been found to be of great service in the field and in hospitals, increasing the efficiency of the Medical Department by an intelligent assistance, and gleaning for themselves an amount of knowledge impossible to be obtained in the study of their profession in civil life, except at the cost of the labor of years.
>
> As no provision was made by the act for the subsistence of medical cadets, it is therefore respectfully recommended that they be allowed one ration for each per diem. There is also no allowance for camp and garrison equipage made for their accommodation in the field. They should have the same as is now allowed subalterns in the Army. It is respectfully recommended that this deficiency be supplied.
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> In view of the advantage derived from the employment of this body of young men, and the increased comfort that is afforded by their means to the sick and wounded of our brave Army, it is respectfully recommended that fifty more cadets be added to the corps, to be appointed in the same manner, and to enjoy the same privileges and emoluments as those already in service."

On February 7, 1862, another bill "to increase the efficiency of the Medical Department of the Army," introduced by Mr. Wilson, Chairman of the Military Committee of the Senate and passed on April 16, 1862, contained the following:

> *Be it enacted, etc.,* That there shall be added to the present Medical Corps of the army ten surgeons and ten assistant surgeons, to be promoted and appointed under existing laws; twenty medical cadets and as many hospital stewards as the Surgeon General may consider necessary for the public service, and that their pay and that of all hospital stewards in the volunteer as well as in the regular service shall be thirty dollars per month, to be computed from the passage of this act. And all medical cadets in the service, shall, in addition to their pay, receive one ration per day, either in kind or commutation.

On April 17, 1862, the medical cadet corps petitioned the Senate Committee of Military Affairs for the rank and pay of a second lieutenant of infantry, but this was apparently laid on the table.

In his report to the Secretary of War for 1862, Surgeon General Hammond makes the following recommendation:

> An Army Medical School in which medical cadets and others seeking admission into the Corps could receive such instruction as would better fit them for commissions and which they cannot obtain in the ordinary medical schools, is a great desideratum. Such an institution could be established in connection with any general hospital, with but little if any expense to the United States. A hospital of a more permanent character than any now in this city, is I think necessary, and will be required for years after the present Rebellion has ceased. I therefore recommend that suitable buildings be purchased or erected for that purpose. If this is done, the medical school and museum will be important accessions to it.

On July 28, 1866, the Wilson bill, fixing the peace establishment of the United States Army, finally became law, but before this time, as will be seen from the dates of discharge in Dr. Mitchell's list, practically all the medical cadets were mustered out of service.

The roster contains the names of a number of medical men who afterward became prominent in the profession, notably, Gen. Robert Maitland O'Reilly, Surgeon General, U. S. Army, during 1902–1909; Dr. Edward Curtis (1838–1912), who was afterward on duty as microscopist in the Army Medical Museum, where he collaborated with Billings in an investigation of Texas cattle fever (1869), with Woodward in photomicrography, and afterward became professor of materia medica and therapeutics in the College of Physicians and Surgeons, New York; Dr. Edward Constant Séguin (1843–1898), the well-known neurologist who introduced the use of the clinical thermometer into American practice and is remembered for his researches on spastic paraplegia, idiocy and the training of the feeble-minded; Dr. Elliot Coues (1842–1899), assistant surgeon, U. S. Army (1864–1876), who became famous through his many books on ornithology; Dr. Burt Green Wilder (1841–), afterward professor of neurology and vertebrate zoölogy at Cornell University (1867–1910; emeritus professor since 1910), who has contributed extensively to the literature of biology and the simplification of anatomical nomenclature; Dr. Albert Vander Veer (1841–), the well-known gynecologist of Albany, N. Y.; and Dr. Frederick A. Castle (1842–1902), already referred to above.

In forming the Medical Reserve Corps, it was General O'Reilly's intention to draw into it leading members of the medical profession, who might, in time of war, be in position to bring into the Corps the best of the younger physicians in their communities. How well this far-reaching plan was carried into effect, we know from the record of our Medical Reserve Corps in the recent war.

List of Medical Cadets in Service During the War of the Rebellion

[Enlisted under provisions of acts approved August 3, 1861, and April 16, 1862.]

Name	Date of enlistment	Date of discharge
Adams, J. F. A.	Dec. 27, 1862	Dec. 27, 1863*
Agnew, Henry	June 13, 1864	June 13, 1865*
Allen, George Otis	Oct. 16, 1862	Oct. 16, 1863*
Allen, John W.	Sept. 17, 1861	Sept. 17, 1863*
Anderson, W. A.	Sept. 24, 1861	
Andress, Theophilus H	July 2, 1862	July 1, 1863*
Andrews, William J.	Apr. 16, 1864	March 9, 1865
Applegate, Lewis	Aug. 3, 1861	Aug. 3, 1862*
Atkins, Francis H	Jan. 6, 1864	Feb. 27, 1864
Atkinson, E. L.	June 16, 1862	Feb. 26, 1863
Atlee, W. L., Jr.	June, 1862	Sept. 18, 1862

* Discharged at expiration of term of service.

List of Medical Cadets in Service During the War of the Rebellion—Cont'd.

Name	Date of enlistment	Date of discharge
Austin, William Morris	Apr. 15, 1864	Apr. 15, 1865* Jan. 24, 1866
Ayres, Lewis C	Apr. 12, 1865	Oct. 24, 1865
Barnes, Edwin	Feb. 4, 1865	Jan. 9, 1866
Barney, Reuben	Sept. 20, 1864	Sept. 20, 1865*
Bates, Edward F	Aug. 23, 1862	Dec. 8, 1862
Bauer, Herman	June 13, 1863	June 13, 1864*
Beach, William T	June 12, 1862	June 11, 1863*
Beers, John E	June 26, 1863	Apr. 25, 1864
Beltz, Daniel E	July 1, 1864	July 1, 1865*
Bennett, George S	July 23, 1862	July 23, 1863*
Birdsall, Samuel	Sept. 4, 1863	Sept. 5, 1864*
Bitting, Louis C	July 23, 1864	Apr. 5, 1865
Blanchard, James A	June 20, 1865	Dec. 14, 1865
Bodman, Lewis H	Aug. 3, 1861	Term of service expired Aug. 3, 1862.
Bosley, G. H	May 2, 1864	Jan. 3, 1865
Bowen, Charles H	Oct. 7, 1861	Oct. 7, 1862*
Bradford, F. G. H	Sept. 24, 1861	Aug. 7, 1862
Bradley, William H	Oct. 1, 1863	Oct. 1, 1864*
Bradley, W. L	Feb. 17, 1863	Sept. 28, 1863
Browne, William A	Nov. 22, 1862	Nov. 22, 1863*
Buckly, William B	Mar. 19, 1863	Mar. 19, 1864*
Buffington, A. L	June 16, 1863	June 16, 1864*
Burnham, W. G	April 18, 1865	Oct. 7, 1865
Burrington, S. O	Feb. 27, 1865	Feb. 27, 1866*
Bush, Theodore	Mar. 17, 1863	July 18, 1863
Campbell, A. W	Sept. 23, 1862	Sept. 23, 1863*
Campbell, Merritt B	Feb. 10, 1865	Oct. 7, 1865
Carleton, Charles G	July 26, 1864	March 3, 1865
Casey, Francis P	Sept. 5, 1862	Sept. 5, 1863 May 25, 1864
Castle, F. A	Sept. 4, 1862	Sept. 4, 1863*
Chamberlain, Myron L	Feb. 6, 1865	Feb. 7, 1866*
Chaney, Thomas M	June 29, 1865	Dec. 22, 1865
Close, Eldridge W	Jan. 17, 1865	Jan. 25, 1866*
Coe, William H	July 22, 1864	Dec. 22, 1864
Comings, Lewis B	Sept. 19, 1864	Apr. 20, 1865
Congdon, E. H	April 16, 1864	April 16, 1865*
Connell, John J	Mar. 21, 1863	Oct. 27, 1863
Coues, Elliott	May 8, 1862	May 8, 1863*
Coxe, Thomas C	Mar. 30, 1863	Mar. 30, 1864*
Crafts, John M	July 12, 1865	Nov. 25, 1865
Crump, A. W	July 29, 1862	July 29, 1863*
Culbreth, George S	April 10, 1865	Sept. 23, 1865
Curtis, Edward	Sept. 6, 1861	Sept. 17, 1862 Apr. 28, 1863
Curtis, Romaine J	Apr. 24, 1863	Apr. 25, 1864*
Davies, Ira L	July 1, 1864	Mar. 20, 1865
Davis, Myron J	Sept. 18, 1861	July 17, 1862
Davis, Rezin P	Sept. 6, 1861	Sept. 6, 1862*
Day, Walter D. F	Aug. 3, 1861	Aug. 3, 1862*
Dean, Henry A	Feb. 27, 1865	Oct. 23, 1865
Dearborn, Brainard	June 24, 1865	Oct. 7, 1865
Delafield, Rufus	Aug. 3, 1861	Died Dec. 29, 1861

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* Discharged at expiration of term of service.

List of Medical Cadets in Service During the War of the Rebellion—Cont'd.

Name	Date of enlistment	Date of discharge
Devendorf, Charles A	Sept. 24, 1861	Sept. 24, 1862*
Dodge, Augustus W	Sept. 26, 1862	Sept. 26, 1863*
	Oct. 9, 1863	Apr. 25, 1864
Doherty, Hugh	Feb. 7, 1865	Oct. 7, 1865
Dougall, Charles H	Sept. 24, 1861	Sept. 26, 1862*
Downes, William H	July 23, 1863	July 23, 1864*
Drake, James S	Sept. 24, 1861	
Draper, Edgar Le Roy	Dec. 10, 1862	May 13, 1863
Draper, Joseph R	May 1, 1863	Dec. 7, 1863
Dudley, Dwight	June 12, 1862	June 12, 1863*
	June 18, 1863	June 18, 1864*
Dudley, Frederick A	Sept. 24, 1861	Aug. 15, 1862
Dulin, Edgar A	Feb. 4, 1865	June 17, 1865
Dyer, A. E	Oct. 7, 1861	Oct., 1862*
Eichelberger, William C	Sept. 24, 1861	Sept. 24, 1863*
Ellet, Charles R	Apr. 28, 1862	
Ellison, Owen	Oct. 29, 1862	Oct. 29, 1863*
Esselborn, Albert P	Oct. 30, 1862	May 16, 1864
Farrelly, Ellis M	Aug. 22, 1862	Aug. 22, 1863*
	Sept. 9, 1863	Sept. 9, 1864*
Fisher, Charles H	May 15, 1863	May 15, 1864*
Fitch, Frederick J	July 2, 1864	Apr. 17, 1865
Fitch, Samuel A	Sept. 18, 1861	Sept. 18, 1862*
Folsom, Norton	Sept. 24, 1861	Sept. 25, 1862*
Forwood, John F. M	Feb. 28, 1865	Oct. 17, 1865
Francis, Thomas	Sept. 6, 1861	
Franklin, Thomas H	June 9, 1864	June 9, 1865*
Fraser, Duncan R	June 3, 1864	Apr. 20, 1865
Frothingham, Edward	June 21, 1864	June 21, 1865*
Fuller, William	Aug. 21, 1862	Feb. 28, 1863
Gail, William H	Dec. 9, 1862	Dec. 9, 1863*
Gilbert, Daniel D	Mar. 29, 1862	Ordered Nov. 10'62
Gill, George F	Apr. 9, 1863	Apr. 9, 1864*
Gillespie, John E	June 20, 1865	Oct. 24, 1865
Graham, John	July 29, 1863	July 29, 1864*
	Aug. 2, 1864	April 5, 1865
Gray, Harry	Sept. 24, 1861	July 8, 1862
Gray, Samuel G	Sept. 24, 1861	Sept. 24, 1862*
Gregory, James R	Oct. 7, 1861	Mar. 30, 1862
Grier, Matthew J	July, 1862	
Gardner, W. H	Sept. 24, 1861	Sept. 24, 1862*
Griffith, Alfred	Apr. 16, 1864	Apr. 16, 1865*
Groot, Cornelius A	Apr. 23, 1863	Apr. 30, 1864*
Grover, William B	Nov. 13, 1863	Nov. 13, 1864*
Gunn, George H	Feb. 4, 1863	Feb. 4, 1864*
Haeffner, G. A	Apr. 10, 1865	Dec. 22, 1865
Hannen, Henry S	May 5, 1862	May 5, 1863*
Hardy, Robert M	Oct. 26, 1863	Oct. 26, 1864*
Harris, David	Sept. 22, 1862	Sept. 22, 1863*
Harrison, Francis H	Mar. 28, 1865	Oct. 7, 1865
Harrison, William D	Mar. 7, 1864	Mar. 7, 1865*
	June 22, 1865	Aug. 1, 1865
Hathaway, Robert	Mar. 3, 1865	Oct. 7, 1865
Haynes, Charles F	June 11, 1862	Mar. 27, 1863
Hayward, Joseph W	Mar. 12, 1863	Mar. 11, 1864*
Henry, Robert J	June 9, 1864	June 9, 1865*
Holman, Samuel	Mar. 8, 1864	June 27, 1864

* Discharged at expiration of term of service.

List of Medical Cadets in Service During the War of the Rebellion—Cont'd.

Name	Date of enlistment	Date of discharge
Holmes, W. J. R.	Jan. 26, 1864	Dec. 9, 1864
Hopkins, George N.	Sept. 17, 1861	Sept. 17, 1862*
Howard, George C.	Feb. 9, 1864	Feb. 8, 1865*
Hoy, Albert H.	July 23, 1863	May 23, 1864
Hubbard, E. D.	Jan. 21, 1864	
Hunt, Charles M.	Mar. 1, 1864	July 16, 1864
Hunt, S. H.	May 2, 1864	May 2, 1865*
Hutchins, Edward R.	Aug. 30, 1861	Aug. 30, 1862
Hutchinson, Edwin	Sept. 24, 1861	Sept. 1, 1862
Hysore, W. F.	Apr. 10, 1865	Dec. 22, 1865
Jorgenson, Joseph	July 23, 1864	Mar. 28, 1865
Keith, T. Scott	May 1, 1862	Jan. 17, 1863
Kerr, George	Oct. 30, 1862	
Kimball, B. M.	July 25, 1864	
Kingston, S. T.	Aug. 23, 1862	Apr. 25, 1863
Knorr, George F.	Apr. 8, 1863	Apr. 8, 1864*
Lampson, Mortimer	Oct. 20, 1863	July 20, 1864
Landers, Thomas	May 16, 1863 June 7, 1864	May 16, 1864* July 18, 1864
Larrabee, John A.	Oct. 10, 1862	Oct. 10, 1863*
Lashells, Theodore B.	Dec. 9, 1861	July 31, 1862
Lautenbach, Robert	June 4, 1864	June 4, 1865*
Leale, Charles A.	Feb. 17, 1864	Feb. 17, 1865*
Le Moyne, Francis	Sept. 24, 1861	Sept. 24, 1862*
Lester, Elias	Sept. 24, 1861	Sept. 24, 1862*
Lewis, George F.	Feb. 6, 1865	Nov. 6, 1865
Light, Abiah H.	Sept. 24, 1861	Sept. 24, 1862*
Livermore, Frank	Sept. 18, 1862	Sept. 18, 1863*
Lloyd, David C.	Feb. 16, 1863	Feb. 15, 1864*
Longshaw, William, Jr.	Sept. 24, 1861	June 26, 1862
Longwill, R. H.	July 23, 1862	July 23, 1863*
Lovell, C. A.	May 23, 1864	May 23, 1865*
Lyford, Elisha H.	June 1, 1864	Feb. 1, 1865
Lyman, John N.	Sept. 5, 1861	Mar. 29, 1862
McFarlan, Malcolm	Feb. 8, 1864	Feb. 8, 1865*
Magruder, John W.	Nov. 15, 1862 Nov. 15, 1863	Nov. 15, 1863* June 1, 1864
Mansfield, R. W.	Mar. 30, 1863	Mar. 30, 1864*
McCollam, Samuel	Dec. 12, 1862	
McElderry, Henry	Mar. 30, 1864	Mar. 30, 1865*
Menzie, George L.	Aug. 22, 1862	
Merrill, George V. R.	Sept. 24, 1861	Sept. 24, 1862*
Mershon, Stacy B.	May 3, 1862 July 9, 1863 Oct. 6, 1864	May 4, 1863* July 9, 1864*
Miles, William H.	Apr. 28, 1863	Apr. 28, 1864*
Miller, Trueman W.	July 24, 1862	July 24, 1863*
Miller, William H.	July 30, 1864	March 3, 1865
Milton, Charles A.	Sept. 23, 1861	
Minassian, Simon G.	Aug. 31, 1861	Sept. 5, 1862*
Minor, John C.	May 4, 1863	May 4, 1864*
Mitchell, Edward D.	Jan. 3, 1863	Jan. 4, 1864*
Mitchell, Ezra, Jr.	Nov. 5, 1864	Nov. 5, 1865*
Montgomery, John J.	July 9, 1864	July 8, 1865*
Moore, John	June 3, 1864	June 3, 1865*
Morris, Henry A.	Apr. 6, 1865	June 5, 1865
Morrison, Henry C.	Mar. 23, 1865	Mar. 23, 1866*

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*Discharged at expiration of term of service.

List of Medical Cadets in Service During the War of the Rebellion—Cont'd.

Name	Date of enlistment	Date of discharge
Motter, George T.	Feb. 2, 1864	Feb. 3, 1865*
Moxley, M. K.	Sept. 9, 1861	Sept. 9, 1862*
	Sept. 9, 1862	Feb. 19, 1863
Munger, Merritt J.	Feb. 7, 1863	Feb. 8, 1864*
Neilson, John L.	Apr. 18, 1864	May 26, 1865
Nelden, Charles R.	July 25, 1862	July 25, 1863*
Newell, Arthur C.	July 25, 1864	May 6, 1865
Nichols, J. DeF.	Sept. 20, 1864	Sept. 20, 1865*
O'Brien, Charles E.	Feb. 28, 1865	Sept. 1, 1865
O'Reilly, Robert Maitland	Jan. 8, 1864	Jan. 8, 1865*
	Feb. 6, 1865	Sept. 23, 1865
Orth, Henry L.	Sept. 19, 1864	Sept. 22, 1865*
Paine, Amasa E.	June 29, 1864	July 31, 1865
Paine, Horatio	Aug. 3, 1861	Aug. 3, 1862*
Painter, J. Elwood	Nov. 15, 1862	Nov. 15, 1863*
	Nov. 15, 1863	May 2, 1864
Palmer, Elmore	Dec. 5, 1862	Dec. 5, 1863*
Parker, Joseph Benson	Sept. 26, 1862	Mar. 27, 1863
Parks, Hinton F.	Feb. 1, 1864	Jan. 31, 1865*
Parsons, John	Feb. 28, 1863	Feb. 28, 1864*
Pelton, Arthur M.	Apr. 21, 1864	Apr. 22, 1865*
Phillips, James A.	Mar. 7, 1865	Aug. 2, 1865
Pick, A. T.	Sept. 24, 1861	Sept. 24, 1862*
	Sept. 24, 1862	Sept. 24, 1863*
Pilsbury, J. M.	Sept. 29, 1861	Sept. 29, 1862*
Pindell, J. T.	April 16, 1864	April 16, 1865*
Pitcher, Steward C.	Aug. 7, 1863	Aug. 7, 1864*
Pooley, Thomas R.	Sept. 5, 1862	Sept. 5, 1863*
	Oct. 8, 1863	June 2, 1864
Porter, Edward E.	July 2, 1863	July 15, 1864*
Post, J. A.	Mar. 26, 1865	Sept. 23, 1865
Pratt, E. B.	Mar. 25, 1865	Dec. 13, 1865
Prentiss, J. L.		
Randall, C. L.	Mar. 25, 1863	Mar. 23, 1864*
Raub, Abraham A.	Mar. 16, 1863	
Reed, Albert S.	Apr. 23, 1864	Mar. 24, 1865
Reed, John W.	Aug. 27, 1863	June 17, 1864
Rice, George L.	Apr. 9, 1863	
Rice, John McD.	May 21, 1862	May 12, 1863
Ridgeway, T. E.	July 25, 1862	
Rippard, William H.	June 11, 1862	June 11, 1863*
Ritter, F. W., Jr.	Jan. 7, 1865	Sept. 11., 1865
Robbins, Henry A.	Aug. 20, 1861	Aug. 20, 1862*
Robert, Charles S.	May 13, 1864	May 13, 1865*
Roberts, Jacob	Aug. 31, 1861	Aug. 31, 1862*
Robinson, Joseph M.	Aug. 1, 1864	Aug. 1, 1865*
Rockefeller, Irwin M.	Apr. 26, 1865	Apr. 26, 1866*
Rorbach, Frederick	June 3, 1864	
Ruger, Henry H.	Mar. 11, 1863	March 11, 1864*
Russ, Eben J.	Nov. 15, 1861	July 31, 1862
Ruth, Melancthon L.	Jan. 7, 1865	Sept. 19, 1865
Sanborn, Charles E.	Oct. 16, 1862	Oct. 16, 1863*
	Dec. 23, 1863	Dec. 23, 1864*
Santee, E. A.	July 22, 1864	July 23, 1865*
Sargent, Eli D.	Dec. 5, 1863	Dec. 4, 1864*
Saylor, George W.	Sept. 9, 1861	Sept. 9, 1862*
Schneider, Louis	Feb. 15, 1864	Feb. 15, 1865*
Searl, Oscar F.	July 27, 1864	July 27, 1865*

* Discharged at expiration of term of service.

List of Medical Cadets in Service During the War of the Rebellion—Cont'd.

Name	Date of enlistment	Date of discharge
Seguin, Edward C	July 31, 1862 Aug. 7, 1863	July 31, 1863* Aug. 7, 1864*
Semig, Bernard	July 1, 1864	Apr. 5, 1865
Senseney, B. Rush	Feb. 26, 1863	
Seward, John L.	June 30, 1865	Oct. 19, 1865
Sheppard, Henry	June 14, 1862	
Shields, George W	Mar. 30, 1863	July 7, 1863
Shoemaker, Edwin B. S	Aug. 25, 1862	Aug. 25, 1863*
Shurtleff, Carleton A.	Mar. 30, 1863	Mar. 30, 1864*
Skillman, A. B	May 9, 1864	
Slaughter, B. F.	Nov. 1, 1864	Mar. 10, 1865
Sommers, John	Apr. 17, 1865	Oct. 7, 1865
Spayd, Charles W	Sept. 24, 1861	Aug. 16, 1862
Stephenson, R. A.	Sept. 24, 1861	Sept. 24, 1862*
Stevens, Lloyd	May 9, 1863	May 9, 1864*
Stillé, Henry M	Jan. 16, 1864 Feb. 27, 1865	Jan. 15, 1865* July 5, 1865
Stone, Richard F.	May 26, 1864	May 26, 1865*
Storror, Edward	Sept. 9, 1861 Sept. 17, 1862	Sept. 17, 1862* Sept. 8, 1863*
Sullivan, John	Sept. 24, 1861	Sept. 24, 1862*
Sweetland, John B.	Oct. 26, 1863	Oct. 26, 1864*
Taylor, William O	Jan. 18, 1865	Oct. 7, 1865
Terabery, George W	Jan. 9, 1864	Jan. 9, 1865*
Thorp, Abner	June 11, 1862	June 11, 1863*
Tonner, John Elexis	Feb. 28, 1865	Sept. 15, 1865
Trimble, E. J. A	May 29, 1865	Dec. 6, 1865
Tripp, John D	May 23, 1864	May 23, 1865*
Trueworthy, E. W	June 7, 1864	June 8, 1865*
Turner, Obed C	Oct. 3, 1862	Oct. 3, 1863*
Vanderburgh, David William S	Aug. 26, 1862	
Van Derveer, Albert	Sept. 5, 1862	
Van Duyn, John	Feb. 3, 1864	Feb. 3, 1865*
Van Gieson, Henry C	Jan. 20, 1863	Jan. 20, 1864*
Veeder, Andrew T.	Sept. 16, 1862	Sept. 16, 1863*
Voris, James H	July 25, 1864	July 25, 1865*
Ward, Charles S.	June 18, 1862 June 24, 1863	June 18, 1863* June 24, 1864*
Ware, Edward H	Oct. 26, 1864	July 27, 1865
Watts, Henry R.	Feb. 25, 1863	Feb. 25, 1864*
Weaver, Charles H.	Sept. 1, 1862	Sept. 1, 1863*
Weil, Samuel H	Sept. 24, 1861	Sept. 24, 1862*
Weisel, E. T.	Mar. 11, 1864	Mar. 11, 1865*
Weisel, G. W.	Apr. 23, 1864	May 3, 1865
Weld, Francis M	May 3, 1862	May 27, 1862
Welsh, Joseph	Sept. 17, 1863	Jan. 21, 1864
Wesseler, Frederick W.	June 21, 1865	June 21, 1866*
White, Columbus J	Oct. 6, 1864	June 5, 1865
White, John S.	Apr. 12, 1865	Sept. 7, 1865
Wiggin, Augustus W	June 17, 1864	Mar. 15, 1865
Wilder, Burt G.	Oct. 27, 1862	May 22, 1863
Williams, Richard J	June 17, 1862	June 17, 1863*
Wilson, C. P.	Sept. 6, 1861	Sept. 24, 1862*
Winants, Josiah O	June 17, 1865	Dec. 13, 1865
Winslow, John	Mar. 7, 1863	
Worcester, Samuel	Feb. 27, 1865	May 31, 1865
Worthington, George C.	March 25, 1865	
Young, John D	Jan. 30, 1864	Jan. 30, 1865*

* Discharged at expiration of term of service.

List of Medical Cadets who obtained rank of Assistant Surgeon and Surgeon of Volunteer Regiments, etc.

John W. Allen, assistant surgeon, 148th Pennsylvania Volunteers.
W. A. Anderson, assistant surgeon, 3d Maryland Volunteers.
William J. Andrews, assistant surgeon, 39th Ohio Volunteers.
L. Applegate, assistant surgeon, 102d New York Volunteers and Assistant Surgeon, United States Volunteers.
E. L. Atkinson, assistant surgeon, 23d Missouri Volunteers and Surgeon, 15th Missouri Volunteers.
W. M. Austin, assistant surgeon, United States Army.
E. F. Bates, assistant surgeon, and surgeon, United States Volunteers.
H. C. L. Bauer, assistant surgeon, 97th United States Colored Troops.
S. Birdsall, assistant surgeon, United States Volunteers.
G. H. Bosley, assistant surgeon, 154th New York Volunteers.
A. W. Campbell, assistant surgeon, 11th New York Cavalry.
F. P. Casey, assistant surgeon, 8th New York Heavy Artillery.
Jno. J. Connell, assistant surgeon, 3d United States Colored Heavy Artillery.
Elliott Coues, assistant surgeon, United States Army.
F. C. Coxe, assistant surgeon, 16th Pennsylvania Volunteer Cavalry.
Edward Curtis, assistant surgeon, United States Army
Myson J. Davis, assistant surgeon, 1st New York Light Artillery and 4th New York Heavy Artillery.
C. A. Devendorf, assistant surgeon, 55th New York, 38th New York, and Surgeon, 48th New York Volunteers.
A. W. Dodge, assistant surgeon, 4th Maryland Volunteers.
E. L. Draper, assistant surgeon, 40th United States Colored Troops.
Jos. R. Draper, assistant surgeon, 11th United States Colored Heavy Artillery.
F. A. Dudley, assistant surgeon and surgeon, 14th Connecticut Volunteers.
C. R. Ellet, Colonel, 1st Mississippi Marine Brigade.
O. Ellison, assistant surgeon, 30th Michigan Volunteers.
C. H. Fisher, surgeon, 96th United States Colored Troops.
N. Folson: surgeon, 45th United States Colored Troops.
Wm. Fuller, surgeon, 1st Michigan Volunteers.
Wm. H. Gail, assistant surgeon, 18th New York Cavalry.
W. H. Gardner, surgeon, United States Army.
John Graham, assistant surgeon, 2d Pennsylvania Heavy Artillery and 149th Pennsylvania Volunteers.
S. G. Gray, assistant surgeon, 20th Pennsylvania Cavalry.
James R. Gregory, assistant surgeon, 99th United States Colored Troops.
C. A. Groot, assistant surgeon, 15th New York Engineers.
Geo. H. Gunn, assistant surgeon, United States Army.
C. F. Haynes, surgeon, United States Volunteers.
Joseph W. Haywood, assistant surgeon, United States Volunteers.
S. H. Hunt, assistant surgeon, 5th United States Veteran Volunteers.
E. R. Hutchins, assistant surgeon, 11th New Hampshire Volunteers.
Edwin Hutchinson, assistant surgeon, 3d Maryland, and Surgeon 137th New York Volunteers.
S. T. Kingston, surgeon, 2d New York Cavalry.
M. Lampson, assistant surgeon, 36th United States Colored Troops.
Thomas Landers, assistant surgeon, 10th United States Colored Heavy Artillery.
T. B. Lashells, assistant surgeon, 12th Pennsylvania Cavalry, and surgeon, 171st Pennsylvania Volunteers.
C. A. Leale, assistant surgeon, United States Volunteers.
F. LeMoyne, assistant surgeon, 9th Pennsylvania Reserve Infantry, surgeon 16th Pennsylvania Cavalry.
E. Lester, assistant surgeon, 14th New York Cavalry, Surgeon 97th United States Colored Troops.
A. H. Light, assistant surgeon, 28th Pennsylvania Volunteers.
D. C. Lloyd, assistant surgeon, 6th United States Veteran Volunteers.
John N. Lyman, surgeon, 3d United States Colored Troops.
H. McElderry, assistant surgeon, and surgeon, United States Army.
George L. Menzie, assistant surgeon, 140th New York Volunteers.

George V. R. Merrell, assistant surgeon, 6th United States Colored Troops, and Surgeon, 5th United States Colored Troops.
William H. Miles, assistant surgeon, 63d United States Colored Troops.
Henry A. Morris, assistant surgeon, 45th United States Colored Troops.
M. K. Moxley, surgeon, United States Volunteers.
A. C. Newell, assistant surgeon, 18th Ohio Volunteers.
R. M. O'Reilly, assistant surgeon and surgeon, United States Army.
A. E. Paine, assistant surgeon, 104th United States Colored Troops.
E. Palmer, surgeon, 29th Michigan Volunteers.
H. F. Parks, surgeon, 135th United States Colored Troops.
John Parsons, assistant surgeon, United States Volunteers.
A. T. Pick, assistant surgeon, United States Volunteers.
S. C. Pitcher, assistant surgeon and surgeon, 143d Indiana Volunteers.
T. R. Pooley, assistant surgeon, United States Volunteers.
C. L. Randall, assistant surgeon, United States Volunteers.
A. A. Raub, assistant surgeon, 4th United States Colored Heavy Artillery.
A. S. Reed, assistant surgeon, 147th Indiana Volunteers.
John W. Reed, assistant surgeon, 115th Ohio Volunteers.
George L. Rice, assistant surgeon, 4th United States Colored Heavy Artillery.
W. H. Rippard, assistant surgeon, Purnell's Legion Maryland Volunteers.
C. S. Robert, assistant surgeon, United States Volunteers.
Jacob Roberts, assistant surgeon, 23d Massachusetts Volunteers.
H. H. Ruger, assistant surgeon, 43d Wisconsin Volunteers.
E. C. Seguin, assistant surgeon, United States Volunteers.
B. Semig, assistant surgeon, United States Army.
B. F. Slaughter, assistant surgeon and surgeon, 55th Kentucky Volunteers.
C. W. Spayd, assistant surgeon, and surgeon 53d Pennsylvania Volunteers.
R. A. Stephenson, assistant surgeon and surgeon, 69th Ohio Volunteers.
E. Storror, surgeon, 1st Oregon Cavalry.
John Sullivan, assistant surgeon, 13th New Hampshire Volunteers.
E. W. Trueworthy, assistant surgeon, and surgeon 7th Vermont Volunteers.
D. W. Vanderburg, assistant surgeon, 10th Michigan Volunteers.
A. Van Derveer, assistant surgeon and surgeon, 66th New York Volunteers.
John Van Duyn, assistant surgeon, United States Volunteers.
H. H. Ware, assistant surgeon, 6th and 100th United States Colored Troops.
E. R. Watts, surgeon, 61st United States Colored Troops.
F. M. Weld, surgeon, 27th United States Colored Troops.
C. J. White, assistant surgeon, 6th United States Colored Troops.
A. W. Wiggin, assistant surgeon, 5th United States Colored Heavy Artillery, assistant surgeon, United States Volunteers, and assistant surgeon, United States Army.
B. G. Wilder, assistant surgeon, and surgeon 55th Massachusetts Volunteers.
C. P. Wilson, surgeon, 138th Ohio Volunteers.
John Winslow, assistant surgeon, 37th United States Colored Troops.

EXPERIENCES OF A NAVAL MEDICAL OFFICER[1]

By Lieutenant LINCOLN HUMPHREYS, M.D.

Medical Corps, United States Navy

[Reprinted from September, 1920, issue of *The Journal of the Arkansas Medical Society.*]

THIS paper is prompted by the fact that there were only four doctors from Arkansas in the naval service during the World War. It will not attempt to outline naval methods of treatment, but will be descriptive of my own experiences, a synopsis of the advantages and disadvantages of the Medical Corps, with the ultimate purpose of clearing up the lack of knowledge of, or lack of interest in, the service.

There are two kinds of duty in the Navy—*sea* and *shore.*

My first shore duty began at the Naval Hospital, Washington, D. C. It is very much like civilian hospitals, except its organization is more thorough. There are both male and female nurses, but the former are called hospital corpsmen. In addition to its medical and surgical staff, consultants from the hygienic laboratory of the Public Health Service and the Naval Medical School are always available. The one incident in my six months' service there worth remembering was the excellent treatment given two severely burned officers who were injured in the wreck of the U. S. S. *Memphis.* Under the care of Commander E. H. H. Old, Medical Corps, and despite the teaching that when large areas of the body surface are burned recovery is extremely doubtful, recovery did take place and with so little contracture from scar tissue that there was no deformity.

My second tour of shore duty was at the Naval Training Station, Norfolk, Va. It was a poor location and has since been abandoned, and the new station established at Hampton Roads is a model of efficiency.

The old station, however, was an important one, and did its share in the training of recruits. The principal work of a training station besides military training divides itself into prophylaxis, both moral and physical. The youngsters receive their antityphoid inoculations, cowpox vaccinations, moral prophylaxis lectures, and are taught personal and general hygiene. The commingling of so many young men, who for the most part had not acquired an immunity to even the diseases of childhood, resulted in many communicable diseases. Besides the exanthemata, pneumonia and meningitis proved our greatest foes.

I think I should say a word about typhoid inoculations. This form of prophylaxis has done more to eradicate enteric fever from the Navy than any other precautionary measure. Triple typhoid in saline has given the most uniform result. When it is considered that there were only 9 deaths from this disease during the calendar year 1918, when the personnel reached 560,000, the efficacy of prevention is realized.

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[1] Read before the Medical Corps Session, Arkansas Medical Society, at the Forty-fourth Annual Meeting, Eureka Springs, June, 1920.

Cowpox vaccinations are performed until there are two pitted scars, and these ordinarily indicate immunity. The modern vaccination in use in the Navy is by multiple punctures in the cutis through a drop of virus.

The medical officer, if he is conscientious in his efforts and makes recommendations by which the health of the personnel will be benefited, can rest assured of the whole-hearted coöperation of his official superior. This is not always the case in civil life, and there must be health officers in this audience who will concur in my statement.

My present duty corresponds to that of an industrial surgeon. The naval gun factory here is the largest in the United States, employing nearly 10,000 men, the medical and surgical cases amounting to about a hundred a day. All the civilians employed in the yard have to be given a physical examination by the yard surgeon before employment.

SEA DUTY

I didn't realize I was in the Navy until I received telegraphic orders to report immediately to the U. S. S. *Hancock* for duty. The ship was lying at Newport News, Va., and I had barely time enough before we put to sea to get my bearings. On board were 1,100 negro troopers, members of a labor battalion, which had hurriedly been recruited from the farming districts of Tennessee, Arkansas and Alabama. Unseasoned as the troops were, we had a number of respiratory diseases before the ship was at sea twenty-four hours, also many, many cases of seasickness. Most of the troopers had never seen a stream larger than a creek, and as the ship began to battle the waves most of them were ready to give up the trip and return. Even in the throes of seasickness there is a humorous side; one of the Negroes was lying supine on the forecastle deck, and periodically he would raise his hands and shout, "Oh, Lawd, take me now!" After all had recovered, they entertained us with plantation songs, dances, etc.

Every Southern doctor, who has handled negro patients, knows they are great "lungers"; by this term I mean they are hypersusceptible to tuberculous and pneumonic affections, and that the death rate is high.

Seventeen cases of pneumonia developed en route to France. This seems a small number and a small task to solve, but when it is considered they took place on a crowded transport, on the Atlantic Ocean, in the submarine zone, and in addition to many other cases of illness, the problem is readily understood. At that time the ship had no isolation ward, and to give the fresh-air treatment meant placing the patients on cots on the upper deck in the stern, for at night, in order not to show any lights to prowling submarines, everything was closed tight, and the ventilation below decks was none too good. Temperatures would have to be taken, and the thermometers carried nearly a block forward, on a darkened ship that was rolling and pitching, to the officers' quarters, where a small light was kept burning, before the result was read. The cots on which the patients were placed had to be lashed to the deck with ropes to prevent their being tossed into the ocean. To cap the climax, the poor seasick Negroes were sprawled all over the deck, making walking more difficult. There were only four deaths from pneumonia, even though the death rate that year on shore was between 80 and 90 per cent.

The result of this experience caused the writer to plan a radiolite thermometer, which could be seen in the darkness as is a radiolite watch. The C. J. Tagliabue Manufacturing Company stated the idea was feasible, and the thermometer would be manufactured provided a sufficient demand was created, and that they had already perfected a radiolite weather thermometer.

One of the multitudinous duties of a medical officer, and one not met with in civil life, is that he has to embalm the bodies of those who die on the high seas. Burial at sea is a thing of the past, except in isolated instances. In port the naval hospitals usually relieve him of this disagreeable task. During the war the bodies of those sailors or soldiers who died at sea had to be brought back to the United States. This meant weeks in some instances, because the transport had to arrive at her destination, coal, wait for a convoy, etc., so that proper embalming was highly necessary, since one of our round trips required six weeks.

En route to France we coaled at the Azores Islands. It was a refreshing change after being confined on a crowded ship for nine days to arrive at a place which nature had endowed with a rugged, picturesque beauty seldom seen elsewhere; they seem to have been painted on the ocean surface. Being very small, it was only recently that they came into world-wide prominence at the time of the transoceanic aeroplane flight. Being very fertile, every bit of tillable land is cultivated; each farmlet, if the term may be used, is separated by earthen walls, and together with the green fields produced the effect, at a distance, of a huge checkerboard. The inhabitants are Portuguese. The houses are painted solid colors—pink, blue, and white. After having a good meal in one of the cafes, I was presented with a bill for 2,250 reis, but it only amounted to a little over $1.

We finally reached our destination—Brest, France.

Including our troops, 15,000 men of the expeditionary force were landed the same day. As Brest is in Brittany, the Bretons were novel sights in their black costunes, casquets and sabots; the noise from the latter on the Rue De Siam sounded like a drove of horses.

The French Moroccans or Singhalese in their turbans and zouave trousers commanded attention, but in their case distance lent enchantment. The most imposing building was the Chateau, which went so far back in antiquity that one felt awed to be in such a place. The dungeon cells had a subterranean passageway, entered by means of boats. The old building was remodeled and served as fairly satisfactory naval barracks. The naval officers' mess was the center of social activities.

On the return trip, we left Brest twenty-four hours before the U. S. S. *President Lincoln* and twenty-four hours after the U. S. S. *Covington*. This may seem of no importance, but it proved to be our salvation, for both of those ships were sunk and we went through untouched. We carried no troops, only a few casuals, and the trip was uneventful until within 300 miles of Bermuda, when a German submarine chased us for forty-five minutes. Due to the vigilance of an apprentice seaman, Du Four, who had hypermetropia, and saw the periscope long before the other lookouts, we were able to outdistance the sub. It was either run or be sunk, the subs being equipped with 6-inch guns and ours only 3-inch.

ARRIVAL IN CHARLESTON, S. C.

After the casuals had been disembarked, we proceeded to this port for three weeks' repairs and went into drydock. During this time we were granted leave, and had the opportunity of visiting Fort Sumter, where the first shot was fired in the Civil War. Our next trip was to take a shipload of marines to the West Indies for distribution to the garrisons at Guantanamo Bay, Santiago, etc. As they are all interesting ports, I will briefly outline under separate headings what I saw.

GUANTANAMO BAY, CUBA

Most everyone is familiar with this winter rendezvous of the Navy. A strange sight near Guantanamo City is the human bone pile, one of many in Cuba, where a custom was to evict the bones from graves on which the rent remained unpaid. Practitioners can secure as many articulated skeletons as they feel disposed to.

SANTIAGO DE CUBA

The second most important city on the island. It is no wonder the Spanish Admiral Cervera lost his fleet. The harbor has a narrow entrance, an abrupt turn, and an expansion into a fair-sized bay, the whole resembling an old-fashioned demijohn. The fort of El Caney and San Juan Hill brought back memories of accounts of Roosevelt's famous charge.

PORT AU PRINCE, HAITI

The capital of the Black Republic made famous by Toussaint L'Overture, who tried to emulate Napoleon. There are 2,000,000 Negroes in Haiti, and I think I must have seen half of them the day we landed. Being a Southerner, I am more or less accustomed to Negroes being around, the English-speaking variety, but the blacks in Haiti speak French; however polished their language is, it doesn't make them any cleaner, for they are the filthiest lot of beggars I have ever seen. The market is a novel sight, because everything is sold by the handful, and the average Haitian regards as delicacies articles repugnant to us. Since President D'Artiguenave has been in office, assisted by the U. S. Marine Corps, what was once a place of disorder, bloodshed and crime has become a fairly peaceful country with, however, frequent bandit uprisings of the Cacos, who occupy the hills. Recently with the capture of a powerful, wily bandit chief, Jean Jacques Peralte, the most of the depredations have ceased.

The homes built by the French plantation owners have pagodas, swimming pools, and all the accessories of a modern American home. The president has a personal body-guard, Sergeant Miller, who is feared more than the man he guards.

CAPE HAITIAN, HAITI

It is very interesting and unusual to see a huge fortress built on the summit of a mountain peak 3,500 feet high, but King Christopher and his slaves accomplished the feat; he also built himself a replica of Sans Souci, Napoleon's place.

SANTO DOMINGO CITY, DOMINICAN REPUBLIC

After the military governor, Rear Admiral Thomas Snowden, and his staff had left the ship, we all went ashore bent on sightseeing and were repaid by standing in the cathedral where Columbus's bones are buried. The first Christian church established in the New World is also here.

SAN PEDRO DE MACORIS, DOMINICAN REPUBLIC

We arrived on a feast day; the fiesta dancers were arrayed in grotesque costumes and worked themselves into a frenzy dancing. I would not have cared to meet any of them after nightfall. A visit to the Consuelo Sugar Central proved instructive, as sugar making in every phase was shown our party.

ST. THOMAS, VIRGIN ISLANDS

Our ship had to coal here, and the task was performed by negro women, who carried small baskets on their heads at 2 cents per basket. The naval captain of our ship was its first military governor. Bluebeards' and Blackbeards' castles were interesting.

This completed our trip around the West Indies, although later some of the above places were visited as many as eight times. After all the marines had been transferred ashore, we went to San Juan, Porto Rico, to transport native soldiers to the Panama Canal, to relieve the Regular Army men so they could be sent to France. San Juan is so much like a modern city that I will not describe it except to say that the road leading from there to the south of the island surpasses anything in Europe for grandeur of scenery.

PANAMA

This is a monument to the builders, especially to the doctor who made such an achievement possible, Surgeon General W. C. Gorgas, United States Army. It was inspiring to me to watch the ships of nearly all maritime nations passing through a canal that was not only built by Americans but is now owned by them, and every ship pays a toll of $1.25 per gross ton. The hospitals at Ancon and Colon are models of efficiency.

NASSAU, NEW PROVIDENCE, BAHAMA ISLANDS

The *Hancock* made one trip to this island from Charleston, S. C., when we transported negro laborers home. They were English-speaking, fine specimens of manhood, and very religious. All the hymns of the Church of England were sung by these 750 Negroes during the three-day passage, and made the trip one of the most pleasant I have ever had.

My trips on the *Hancock* also included the United States ports of Galveston, Savannah, New Orleans, and Philadelphia. In one year and a half we traveled 55,000 miles in the Atlantic Ocean and Caribbean Sea.

THE ADVANTAGES OF THE MEDICAL CORPS OF THE NAVY

(*a*) *Extensive Travel.*—From the narrative of my travels one can readily see that feature. The average practitioner, if he can arrange to have someone look after his practice, usually takes a short vacation each summer, and probably visits some large city for a post-graduate course, thus combining business with pleasure, naturally detracting from the latter.

(*b*) *A Broader Knowledge of the Field of Medicine.*—This means one is in constant touch with those who are foremost in their respective branches. Work is constantly being supervised by official superiors, with benefit to the individual and the corps which he represents. When assigned to duty as the senior medical officer of a ship, he must be able to meet any emergency, such as performing an appendectomy when the ship is rolling so that it is difficult to maintain a footing and the operating table has to be lashed to the deck. A quarterly bulletin and weekly instructions from the Bureau of Medicine and Surgery keep the individual posted on the latest developments in the medical and surgical world. Courses are given at the Naval Medical School for those who wish to specialize, and post-graduate courses arranged for at such clinics as the Mayo brothers'. While I was in Philadelphia last summer (ship was in port for four months), I had an opportunity of attending the clinics and lectures of Drs. John B. Deaver, J. C. Da Costa, H. A. Hare, and J. F. Schamberg. This was all gratis and a courtesy extended to us.

(*c*) *A Definite Income.*—This relieves the doctor from depending upon the whim of the patient as to when he shall be paid for services rendered. It does away with the commercializing of our profession. With definite income assured, and systematic saving, the future is provided for.

(*d*) *Regular Promotion.*—This comes about after aptitude for the service is demonstrated, and is a reward for efficient services. It means that each member of the corps must keep studying to improve himself and the corps which he represents. It develops a spirit of healthful competition, which keeps one on the *qui vive*, whereas in civil life a doctor is kept so busy that his studies are oftentimes neglected, and he does well to read a medical publication at irregular intervals.

(*e*) *Retirement.*—After service up to 64, if not retired sooner for disability incurred in the line of duty, an individual is retired with three-fourths pay for the rest of his life. With this provision made for the future, there is no fear of old age.

There are no real *disadvantages* except to the married man, who must alternate every three years between sea and shore duty, and that changes outside the continental limits of the United States entail some hardships. Uniforms were formerly a source of great expense, because a different type was worn for each occasion. Since Secretary Daniels has been in office, all cocked hats, epaulets, etc., have been thrown into the discard.

In closing this article, I do not think it would be complete without mentioning the part the entire Medical Corps played in the war. The following is an extract from Surgeon General Braisted's report to the Secretary of the Navy on Medical Department preparedness, viz.:

> Never in the history of warfare has there been such a movement of troops so well taken care of, their health protected in every way, every detail of sanitation receiving strict attention, and elaborate provisions being made for the care of the sick and wounded, with special provision for the insane. The provisions made proved ample, not only for the care of the sick troops in transit, but for the actual return of 151,649 army sick, wounded and insane; 4,395 navy and 3,626 marines from the expeditionary forces in France alone.
>
> The death rate of the Navy from diseases for the period of the war was 8.8 per thousand of total strength, the lowest death rate ever recorded for the military or naval forces of the United States in actual warfare lasting through all seasons of the year.

HISTORY OF THE ACTIVITIES OF THE ATTENDING SURGEON'S OFFICE

By Colonel R. F. METCALFE

Medical Corps, U. S. Army

BEFORE the entry of the United States into the European War the Attending Surgeon's Office was located at 1106 Connecticut Avenue, occupying portions of the second and third floors of the building. Col. T. C. Lyster was the Attending Surgeon, with Maj. A. M. Whaley and Capt. H. A. Beeuwkes as assistants. The functions of the Attending Surgeon and assistants are to care for the officers and enlisted men on duty in Washington, their families and also retired officers and enlisted men.

The three medical officers on duty prior to the war were extremely busy when war was declared. A great increase in the numbers of officers and enlisted men in Washington occurred and the families of a majority of the regular officers flocked to Washington when the officers were ordered abroad. This put an added strain on a force of doctors already overworked. Expansion was started. In July, 1917, the entire second and third floors were leased, more medical officers secured. The need for trained medical officers in the field was so great that the active ones were ordered out and retired medical officers assigned to active duty, but as the need for active, able-bodied men was great they were ordered to the field and their places filled by those physically unable for field service. Of course there was a great need for energetic men here and a number of able-bodied medical officers were retained in the active departments, much against their wishes, all of them wanting to go to France. The policy, however, was maintained of letting as many go to field service as could be spared.

The influx of officers and enlisted men and civilian clerks to Washington was so great, the withdrawal of doctors from civil life and sending them to the field so urgent that it left a rather serious condition of affairs, which required immediate relief, and the following recommendations were made by the Surgeon General, March 4, 1918:

March 4, 1918.

From: The Surgeon General of the Army
To: The Secretary of War.
Subject: Dispensary and Emergency Station.

1. Authority is requested to establish a War Department Dispensary and Emergency Station at Unit C, Henry Park Building, Sixth and B Streets, NW., for the purpose of meeting the unusual and urgent demands for dispensary service for officers and their families, and emergency work for civilian employes. This request is in compliance with the request of the Secretary of War.

(Signed) W. C. Gorgas,
Surgeon General, United States Army.

(1st Indorsement)

War Department, *March* 6, 1918.

Approved:

(Signed) B. Crowell,
Acting Secretary of War.

March 5, 1918.

From: The Surgeon General.
To: The Secretary of War.
Subject: Additional Dispensary and Emergency Station.

1. In connection with a suggestion for the establishment and conduct of an additional (temporary) dispensary and emergency station in the Henry Park Building at Sixth and B Streets, N. W., at which it would be possible to afford emergency treatment to the civilian employes of the War Department, and dispensary service for officers (and their families), connected with bureaus located in this section of the city, this office will recommend to The Adjutant General the issuance of the necessary orders assigning a sufficient number of medical officers, nurses (to include visiting nurse service), and enlisted men to such a dispensary as soon as it may be established.

2. Such medical supplies and equipment as may be necessary in the dispensary and medical supplies for the emergency station and rest rooms will be issued by the Medical Department as to other dispensaries maintained by it.

3. It is understood that the Medical Department personnel, including medical officers, nurses and enlisted men, will remain under the supervision of the Surgeon General and that he will be responsible for their selection.

4. This office is prepared to recommend the issuance of the necessary orders upon receipt of your approval of the establishment of the dispensary and rest station and the assignment of the space necessary.

For the Surgeon General:

(Signed) C. L. Furbush,
Lieut. Colonel, Medical Corps, National Army.

(1st Indorsement)

War Department, *March* 6, 1918.

The foregoing plan as outlined by the Surgeon General is approved, attention being invited to the approval of the establishment of an additional dispensary and emergency station as indicated on a separate paper herewith.

The Surgeon General is requested to confer with Mr. G. H. Dorr, Room 242, Secretary's Office, War Department Building as to the amount of space which will be required.

(Signed) B. Crowell,
Acting Secretary of War.

Regulations governing the operation of dispensary, emergency and rest rooms in buildings of the War Department, Washington.

I. Dispensary has been established at Sixth and B Streets, Unit C, with emergency rooms or rest rooms in other War Department buildings, all under the exclusive jurisdiction of the Surgeon General of the Army in so far as medical administration and care of sick and emergency cases are concerned.

II. Civilian employes of the department may secure emergency treatment at the dispensary and emergency rooms and such assistance as it may be possible to provide at rest rooms.

III. A visiting nurse service has been organized and it is directed that the names and addresses of all employes reporting sick or who are absent and unaccounted for be reported promptly to the Emergency Dispensary, Sixth and B Streets, each day in conformity to the schedule arranged by the Surgeon General. The importance and necessity of this to the department and the full coöperation of all bureaus and offices is essential to secure the results desired.

IV. It should be understood that the facilities available are intended only for emergency cases and that with respect to chronic cases of illness the medical officers will limit their assistance to advice that a civilian physician be consulted by the employes.

Approved:

(Signed) N. D. BAKER,
Secretary of War, April 20, 1918.

The conditions requiring this expansion are well described by Maj. James A. Britton in his report for 1918 to the Attending Surgeon. Copy follows:

Without any additional provision in the way of housing, without any addition in the way of hospital facilities and with the usual number of doctors and nurses greatly reduced to meet the needs of the Army and Navy, between the date of the declaration of war by the United States and the first of January, 1918, Washington as a city was called upon to adjust itself to the enormous burden of housing, feeding, and otherwise caring for an addition to its population of nearly 100,000 people. The urgent cry of the War Department for clerical help in its various branches resulted in a never ending stream of thousands of willing workers, mostly girls, pouring into the city, a large percentage of whom were experiencing for the first time the difficulties of establishing themselves in a strange town away from friends and relatives.

In spite of the enormous numbers coming to Washington it began to be noticed that those coming to work soon lost their enthusiasm, gave up their work and returned to their homes. The short period of service assumed the aspect of a very serious and expensive problem. In some divisions the "labor turnover" amounted to as much as 15 to 20 per cent per month.

As the problem of "labor turnover" became more and more serious it was commonly agreed that the two most evident causal factors were, first, the difficulties of finding suitable living places, and, second, the increased health hazard incident to overcrowding in both sleeping and eating places. A typical story was that of a refined, well-educated, very competent stenographer who came from a well-to-do home in Denver. She has always been well and strong. She came to Washington and took a room for a day or two at one of the hotels till she had time to find a suitable place. It looked easy enough but it was nearly a week before she found anything, and then as a last resort she decided to share a room with two other girls who had come to Washington from Indiana and wanted someone to help with the expense. There was a restaurant three blocks from her room where she could get her meals "just when she wanted them." Everything was very interesting and exciting at first. There were so many new things to learn and hear about. Soon, however, she began to notice that she was not sleeping well, also the food at the restaurant which could be had "any time one wanted it" had lost its appeal. A day or two later her roommates, when they returned from work, found her in bed crying. She did not know what was the matter but she thought she was sick. Calling a doctor was suggested but neither of the three knew any doctor in Washington. Finally they decided to consult the landlady. O, yes, she knew three or four doctors. One was no good, but the other three were all right. So they called up the three in turn. The first had left a few days before for the Army, the second was too busy to call till the next morning, and the third was in the Navy. She was really better the next morning, but for the first time all the disadvantages of her room and the old restaurant and the possibility of this combination making her really sick and then worst of all a town where you couldn't get a doctor. Two days later she was on the train bound for Denver.

This case is given in detail because it is really what happened in thousands of cases.

A tremendous effort was made to increase and improve facilities, particularly for the girls coming to Washington.

The next big problem was to meet the need for medical service. The knowledge that in a great number of cases girls left the work here in a panic over inability to get medical service made it seem necessary to devise a system of medical service which could be easily and promptly reached in case of any emergency. In April, 1918, on order of the Secretary of War a dispensary system was established for emergency service for civilian employees of the War Department. This work was organized by the Surgeon General of the Army and placed under the immediate supervision of the Attending Surgeon. The system consisted of four divisions, viz.:

1. A central dispensary, equipped for all sorts of emergency care and manned by medical officers, contract surgeons (women) and trained nurses.

2. "Emergency Rooms" one in each building occupied by the War Department. Each room in charge of a trained nurse.

3. A group of Visiting Nurses.

4. Volunteer Health Committees in each bureau of the War Department.

The general plan of operation provided that any employe who felt ill while at work would report to the nurse in charge of the nearest Emergency Room. The great majority of all complaints could thus be relieved at once and the employe immediately be enabled to return to duty. More serious cases were held and a doctor called from the central dispensary or the patient sent or taken direct to the dispensary. The great majority of all cases coming to the dispensary were not of a serious nature and were treated and at once returned to duty or at most relieved by a day or two rest in bed at home. Those cases of a more serious nature were seen in their homes by visiting nurses and doctors from the dispensary, if the patients were unable to get their own physicians. By coöperation with the various city hospitals patients requiring hospital care were admitted and attended by the dispensary staff.

Before the war there was a lack of hospital beds in Washington to meet the ordinary needs of the city. It was early recognized by the Attending Surgeon that even in a mild epidemic there would be many more hospital beds needed than would be available. Plans were under way by the Housing Corporation and also by the Attending Surgeon to provide additional hospital beds but the arrival of the influenza epidemic made it necessary to institute emergency measures. This emergency was met by the establishment of emergency hospitals by the Public Health Service. A recurrence of the epidemic has made it necessary to establish another hospital. This is now being conducted under the coöperation of the Public Health, the District Health Office, the Red Cross and the Attending Surgeon. The present arrangement can of necessity be only an emergency and temporary arrangement. Washington still needs from 500 to 1,000 additional hospital beds and the health hazard here can only adequately be met when the District has made such provision.

Those who were taken ill while at home were visited by a "visiting" nurse, who rendered nursing care and arranged for such other service that might be necessary.

A steady growth in the various bureaus of the War Department made it necessary to increase from time to time the number of emergency rooms, the number of dispensaries and the number of nurses and doctors. The maximum number of emergency rooms was 22, the maximum number of dispensaries 3, the maximum staff consisted of 18 doctors (8 medical officers, 10 women contract surgeons) and 45 nurses.

The number of people cared for by the dispensary through its various divisions rapidly increased from the time of its organization in April till in July there was an average of over 500 cases per day. This number continued to increase and reached its maximum in October when the average for the entire month was over 1,000 patients per day. This number decreased in November to about 800 patients per day; in December there was a still further decrease to about 700 per day.

In spite of the increase of equipment and staff it became increasingly evident that the need for this service was much greater than could be furnished. The various rooms became much congested and the staff became exhausted from overwork. Volunteer helpers were solicited and were found to be of great assistance in caring for the cases of minor illness and as nurses' aids in attending the sick. The lack of trained workers became more and more acute every day and it was seen that the only source of relief would be through partially trained volunteers. With the approval of the Surgeon General the Attending Surgeon submitted to the Secretary of War a plan for the organization and training of Volunteer Health Committees. This plan was approved October 31, 1918. Since then these committees have been organized in all the larger War Department Bureaus and have been a great help to the dispensary in satisfactorily meeting the requests for service.

It has been shown here, just as in many industrial establishments, that the service of the dispensary and its staff has made it possible for thousands of clerks to continue at their work when but for this service they would be at home and it is safe to say that the encouraging word of a nurse or doctor has been the means of preventing hundreds of girls from becoming discouraged and deserting jobs where they were badly needed.

The war over, conditions changed rapidly. Doctors who left Washington to go into government service soon got back to their old obligations as civilian practitioners. Conditions soon became such that civilian employes could get adequate service without assistance from the Attending Surgeon.

The maintenance of emergency rooms, however, has been recognized for some time by all business efficiency experts as a necessity in all offices, stores and other industrial establishments. Hundreds of cases of half-day absences can be prevented in a year by a few minutes' attention of a competent trained nurse.

When the armistice was signed November 11, 1918, the Attending Surgeon's Office consisted of one main dispensary, 1106 Connecticut Avenue (this having been increased to include one section of the ground floor in addition to second and third floors). Subdispensary No. 1 at Sixth and B Streets, N. W. Subdispensary No. 2 at State, War and Navy Building. Subdispensary No. 3, in The Munitions Building. Twenty-two emergency or rest rooms in various War Department buildings each in charge of a trained nurse and six Supervising and Visiting Nurses.

A dental department was opened July 20, 1917, and was gradually increased to 8 chairs with a complete dental laboratory. Enlisted dental assistants were released for field service and in August, 1918, trained (women) dental hygienists were installed. In the other departments men were released and women appointed to such positions as they could fill. When treatment of civilian employes was authorized women were appointed as Contract Surgeons and assigned to the dispensaries where the young women employes might consult them and be spared the embarrassment of consulting male physicians.

During the influenza epidemic the civil and military hospitals filled to their maximum capacity. Public Health Service hospital was opened on Virginia Avenue in a temporary building which permitted hospitalization of a large number of war workers and was under the supervision of the Attending Surgeon and later a building at 612 F Street, N. W., was converted into an influenza hospital and controlled jointly by the Attending Surgeon, the city public health, the National Public Health Service and the American Red Cross. The Attending Surgeon took the top floor and supplied the nursing, enlisted and medical personnel.

Brig. Gen. T. C. Lyster, the Attending Surgeon, was also the medical director of the Air Service and had little time to devote to the Attending Surgeon's Office. Maj. James A. Britton, under General Lyster's direction, organized and supervised the subdispensaries and emergency rooms, while Lieut. Col. J. O. Skinner, a retired medical officer, acted as executive officer at the main dispensary.

The city was divided into six districts and a visiting physician assigned to each.

Up to the signing of the armistice all departments were being actively expanded. When the undersigned reported, January 9, 1919, the influenza epidemic was subsiding, the war had ended, the commissioned and enlisted personnel wanted to get back to their civil occupations and War Department employes were being let out of service. This called for a reduction of the organization.

At this time the personnel required in the four dispensaries and twenty-two emergency rooms was: 35 medical officers, 9 women contract surgeons, 8 dental surgeons, 5 Sanitary Corps officers, 2 laboratory technicians (women), 61 nurses, 33 civilian employes, 32 enlisted men (including four men borrowed from Walter Reed General Hospital for use in the influenza hospital) making a total of 185 persons attached to the office and its various departments. February 12 the portion of the Influenza Hospital, 612 F St., assigned to Attending Surgeon was released and personnel withdrawn. Emergency rooms consolidated.

special departments of subdispensaries closed until May 9, 1919, we might say the termination of the war (peace terms had been handed to the enemy) we had the four dispensaries and eleven emergency rooms with a personnel of: 15 medical officers, 6 contract surgeons (women), 8 dental surgeons, 1 Sanitary Corps officer, 1 laboratory technician, 44 nurses, 15 enlisted men, 26 civilian employes, showing a reduction of 95 of the personnel which was further reduced as soon as authorization was received to close all subdispensaries, which was accomplished as soon as the emergency ended, four months after the signing of the Peace Treaty.

Recently the main office has been organized on the group of unit plan with a Chief of Medical Service, Chief of Surgical Service, Chief of Ear, Nose and Throat Department, Chief of Eye Department, Chief of Dental Departments and a Chief of Laboratory Division. The X-ray and Obstetrical Departments have been consolidated under the head of Medical Section.

A central filing system for patient's records has been installed, a medical secretary employed and histories from brief notes to complete histories are kept in every case. Simple cases not requiring much study are simply noted down, the diagnosis and treatment outlined. Every time a patient reports the medical record in the case is sent to the doctor to be consulted.

A complete X-ray plant with the bedside machine has been installed and this is found ample for all classes of cases except intestinal. These cases are being sent to the Army Medical School when necessary.

Plans are being worked out to continue the emergency treatment rooms in charge of nurses for War Department employes and the discontinuance of subdispensaries as there is now no difficulty in employes securing civilian medical attention.

If efficiency in this Department is to be maintained it will be impracticable to ever reduce the personnel to its pre-war status.

From May 1, 1918, to April 30, 1919, there were treated in the emergency rooms and subdispensaries 254,069 war workers, in addition to the officers and enlisted men and their families in the District of Columbia. It was a tremendous task, and successfully accomplished.

* * *

THE CHILDREN

IN THE formality of parade and in the strife and wreckage of the battlefield—the idealistic and materialistic sides of war—there does not seem to the casual thinker any very specific place for the child.

It is, however, the child of today who is to fight the battles of tomorrow, and if we are to consider warfare as a constructive rather than as a purely destructive phase of life it is quite evident that the thews of the state are those who still in their immature years are to be the citizens who shall before long guide the destinies of countries. Lost largely in the welter of battles won and causes lost this problem of child welfare does not make a general appeal to those who scan the press for news of advance or retreat. Yet, it *is* of the very first importance and not alone from the standpoint of civil administration, but from a strictly military point of view as well. We hope to print in a coming number of the MILITARY SURGEON an article which shall show that this is true. In the meantime, we are giving space to the three articles which follow in order to give some idea of what was done along these lines while the armies were fighting in Flanders—THE EDITOR.

FOR THE CHILDREN OF PARIS

By ESTHER ANDREWS

The crisis of France is not on the battle line alone. There present-day France fights—but the France of tomorrow is struggling for existence in the alleys and byways of her big cities. and in the courts of her farms. Whoever wins the war, if France's children are undernourished and uncared for, the France of tomorrow must lose the peace that follows.

That is why the American Red Cross is spending some of its dollars for the children of Paris.

Since November 1, the Children's Bureau of the American Red Cross has established in the manufacturing and poor residential districts of Paris nine health centers for the treatment of babies and women of the district and for refugees. These centers have been equipped, and are at present in charge of American doctors and nurses, who will conduct an educational campaign to better the health of the neighborhoods, a campaign that is to combine both medical and social service.

The plan has considerably broadened since its first conception. It was at first intended only that the Children's Bureau should conduct a children's clinic in connection with the Rockefeller Foundation for the Prevention of Tuberculosis. The first joint dispensary was opened in the nineteenth arrondissement. a dreary, desolate district of slums and factories. The start was experimental—using this section as a field; a thorough study of health, especially tuberculosis conditions, was made and work planned accordingly.

It was seen that the children's work must grow beyond the scope of one dispensary and clinics for the treatment of tuberculosis. The tiny rooms quickly became inadequate and the doctors were so pressed that patients had to be turned away. Plans were immediately put in operation for more dispensaries in this arrondissement. One was opened the first of February, in the rue St. Mingott, and two more are well on the way. These treat all forms of children's diseases.

So the work began. From this have grown the other general clinics for women and children which the Children's Bureau, working independently of the Rockefeller Foundation, has founded in various and diverse sections of Paris.

In every case, these health centers have been started in cooperation with existing French organizations. Obviously this was the only way to give intelligent aid. The trouble is not that France lacks efficient organizations for the help of her civilian population but that, after three years of war, these organizations lack money and equipment necessary to continue their work, and this is where the American Red Cross can help.

One of the most interesting of these French charities where the Children's Bureau has given substantial aid, is the Oeuvre de Mlle. de Rose founded by Mlle de Perignan, a granddaughter of La Fayette. She opened what the French call a "Patronage" for children and young girls, in the fifth arrondissement.

The fifth arrondissement is one of those districts, common to all big cities, where the only social meeting place is the street. It is one of the oldest sections in Paris, where little squares with stunted trees pop up unexpectedly at the turn of a corner and the streets are crooked and narrow, linked by crumbling steps or dark alleys. The houses are old and filthy and over all hangs the foul stench of the near-by tanneries. It is a "tough" district; the rue Mouffetard, said to be the toughest street in Paris, winds its dirty way through this section. There was need of a "Patronage" here, need of giving something to lift a child out of his sordid surroundings.

Mlle. de Perignan died in 1906, bequeathing her charities to two friends, Mlle. de Rose and Miss Hopkins, a woman of American parentage living in Paris. Both had substantial private incomes and both were inspired with a real flame of service, so they pooled their incomes and proceeded to devote it to their legacy.

The "Patronage" continues in the same funny little house, so old that its stone floors are worn into hollows. The children of the district throng there for their classes just as before, but in daily increasing numbers. At the age of nine, the little girls begin to learn sewing. They come one afternoon a week and are taught to make their wedding trousseaux! Stowed away in armoires awaiting the wedding day are neat little piles of underclothes which these little ones have spent many months in making, of course material, but exquisite workmanship, some of them elaborately and intricately embroidered, others simpler, but all made by hand and with the finest stitches. Then there are heaps of towels and bed linen, all the things necessary for the marriage portion. To an American it seems quaint. The little French girl is educated to expect marriage; isn't the training of the modern American child designed for just the reverse?

Out of the Patronage grew many other activities. Mlle. de Rose opened a boarding house for the girls who had outgrown the patronage and gone to work in the world. Mlle. de Rose and Miss Hopkins both live the simple life of this working girls' home, simple as it is, almost monastic. Here are housed forty girls who pay a modest sum for board and lodging; forty more who come for their midday meal.

As the years went on, this little home could not accommodate all the girls who demanded entrance, so Mlle. de Rose decided to build a larger house, with accommodations for a hundred girls. It was started and the walls were up when the war stopped everything. Now it stands, an empty shell waiting to be filled, perfectly finished inside, but without floors or woodwork or finishing of any kind on the interior. The usual cry—labor lacking—prices soaring!

Another project of Mlle. de Rose was not stopped by the war—the erection of a model tenement house by a French charitable society at the instigation of Mlle. de Rose. How valuable such an enterprise was to be, she herself did not guess. Large families are not encouraged by French landlords and the poor often have difficulty finding a place to house their children. This apartment house was designed to give a home to families with many little ones. The larger the family, the larger the apartment and the smaller the rent, and no family without a child is admitted. It accommodates sixty-six families and is always full—one family has ten children.

Never tired, and daunted by nothing, Mlle. de Rose has reached out in many directions. Her greatest longing is to get the children away from the congestive life of sidewalks and cafes, out into the country, onto the farms. To this end, she is establishing, in various parts of the country agricultural centers where little boys and girls, expecially those too delicate to stand the life of the city, may be sent to study agriculture while regaining their strength, and so be lured away to more healthy life. The Franco-American Committee which is affiliated with the American Red Cross is helping Mlle. de Rose to establish the largest of these agricultural schools on the south coast of France.

A medical center was sorely needed in every one of these different activities. It was needed for the children of the patronage, it was needed for the girls in the boarding house, and especially was it needed to select the children to be sent away to the country. The incomes of the two patronesses had been badly cut by the war and the aid of many of their supporters had been diverted to war charities. A dispensary had been planned for the shop on the first floor of the "model tenement" and the money and equipment had been promised by a French woman. But when the war came, she gave it to an ambulance instead and shop stood empty until the American Red Cross came to Mlle. de Rose's aid, installing a doctor and nurses there, equipping the big rooms for clinics for the children and women of the district and starting the work of home visiting.

The American doctor was busy with her stethescope the day I visited the dispensary—sounding the chest of a young Belgian refugee, who, when she saw me pulled her cotton kinono about her with a gesture of beautiful unconscious grace. She was very young and fragile.

From the waiting-room outside came the sound of snuffles and coughs and shuffling feet. It was only the second clinic—boxes of supplies were still coming in the front door, and the furniture was piled along the sides of the room—yet twenty-six children has passed through the doctor's hands that day, and more were waiting,

A health center that grows daily in importance is that surrounding the refugee dispensary at 12, rue Boissy d'Anglas, taken over from the Societe de la Guerre, of which Mrs. Edith Wharton was the director, by the Rockefeller Foundation and the Children's Bureau. Right in the center of Paris, it is housed in a new warehouse which is divided by half partitions into several rooms. It is spotlessly new and clean; a touch of bright color lent by striped tablecloths livens up the background. A strangely assorted group swarms the rooms, all kinds and conditions of folk; some poorly clothed, others prosperous looking—as motley a crew as ever came together, from swarthy-skinned Serbians to apple-cheeked Alsatians. It is a busy dispensary—300 patients weekly are treated, and it includes the medical work of the American Friends Unit—an "Amie" in her quiet gray uniform is always at the clinics. Two days a week are given to children and two days to Servian refugees. Dr. Richard C. Cabot, of Boston, who gives this dispensary his personal attention, was one of the first in America to recognize the need of social service in connection with public health work and present methods owe much to his energy and influence.

Another important center is in Levallois, a manufacturing district just outside Paris, flat and cheerless, it has none of that quaintness which even squalor cannot down, such as one finds in the Fifth Arrondissement. In Levallois the smell of the tanneries is replaced by the aroma of a perfume factory. Heavy, nauseating, it permeated the whole section.

The "Neighborhood House" of Mlle. Bassot is in Levallois. With the individualism so characteristic of a Frenchwoman, Mlle. Bassot, who had never heard of a social settlement and did not bother to inquire whether anyone had ever had such an idea before, decided to open a house in Levallois for the use of the people, to go to live in it herself, and so help to bridge the social chasm between her own set and the women workers.

Before the war, Levallois had a population of 70,000; the influx of refugees and the growth of manufacturing plants has increased the population to 100,000. Seventy thousand people found life crowded in Levallois but the addition of 30,000 with no new building possible has aggravated the already serious housing problem. The congestion is bad, and the spread of disease threatening. Mlle. Bassot found herself in much the same situation as Mlle. de Rose—less money and more need. She had already started a campaign against tuberculosis under the leadership of Dr. Guinon of the Hospital Bretonneau, but what she wanted and had no means of getting were general clinics for women and children.

The children's bureau has done it for her. Dr. Bancroft, the physician in charge, beams with enthusiasm every time the work is mentioned. She loves the work, she loves the people and she is especially enthusiastic about the coöperation of the French doctors.

"American methods are sometimes different from the French," she said. "but the doctors are always willing to try them, and so are the people. In fact, I mildly suggested to Dr. Guinon once that he tell the patients some little things like washing their teeth or keeping their windows open, and he said, "I could tell them that until I was tired, but all you need to do is put up an order to that effect, sign it the American Red Cross, and it's done—at once.""

A district similar to that of Levallois though much larger is La Courneuve, and a doctor and nurse were wanted there to hold clinics for mothers and children. The Red Cross supplied them and it is estimated that now 300 families are thus reached. The Grenelle Mission, another social settlement on the rue l'Arve, has been provided with a doctor and nurse, and the Kremlin—Bicetre Mission has a nurse.

Thus a very large area of Paris is covered and the plans are still expanding. Daily, the health center enlarges its scope. Not only does it care for the health of its neighborhoods, but through home visiting it finds many ways to relieve the lives of the people. Children's health depends largely on food, and one of the first things discovered by the American doctors was the fact that the children who came to the dispensaries though not always underfed, were undernourished—were not receiving the proper kind of food. This led to an investigation. It was found that, because most mothers had been forced by the war into work outside their homes, the children were forced to take their midday meal, the most important meal of a French household, in the school canteens. Thus it came about that the American Red Cross, late in January, began providing supplementary food—flour, beans, condensed milk, ham, sugar, tinned beef, cheese bought in America, to the school canteens of the nineteenth Arrondissement. As rapidly as possible, this service will be extended to the schools in other needy districts of the city.

And another important, perhaps the most important part of it all is the preparation that is being laid for the carrying on of this health work in that happy day when the French shall be given back their own country, and many of the Americans will go home. These plans are being laid in close coöperation with the French medical authorities. Dr. William Palmer Lucas, professor of pediatrics in the University of California, and chief of the Children's Bureau, Dr. William Charles White, of Pittsburgh, chief of the Bureau of Tuberculosis of the American Red Cross, Dr. Livingston Farrand, president of the University of Colorado and chief of the Rockefeller Foundation for the Prevention of Tuberculosis in France, and a group of other American doctors, in consultation with prominent Paris physicians, have worked out a plan whereby French nurses will be trained to continue the work both medical and social. The training period will cover ten months—five in institutional training and five in field work.

Constructive work, this—and building for the France of tomorrow. If Red Cross hopes are realized and the work now in the shaping is fully carried out, the present-day boys and girls of France will, as sturdy old men and women, recounting their memories of the great war, tell their children and grandchildren how Allies from over the sea laid France's foundation, and theirs for years of health and happiness.

THE A. R. C. AT LYONS: A CAMPAIGN FOR THE CHILDHOOD OF FRANCE

Paris, *March* 8, 1918.

The 6th of April is the anniversary of America's entrance into the World War. Also April 6, 1918, is the date chosen by the American Red Cross for the opening of its Child Welfare Exhibit at Lyons, France, and for its formal entry upon its campaign against a danger that threatens a greater mortality for France than the enemy across the eastern frontier.

In this campaign there are three necessary steps: (1) to win the interest and support of the authorities and of the French medical profession; (2) to create through child welfare exhibitions a vigorous and enthusiastic public opinion and to aim at the same result through other propaganda work and education; (3) to train and send out French home-visitors to put into actual practice theories of child hygiene.

The Child Welfare Exhibit at Lyons is to be given with the hearty coöperation of Senator Herriot, the broad-minded, large-souled mayor of that city, which is the third greatest in population, but in some ways the most progressive, of France. The senator-mayor has placed at the disposal of the Americans the new exhibition rooms built for the automobile manufacturers at the great sample fair in Lyons. This is the third of Lyons' sample fairs, and is in progress at the present moment and a great success. The automobile pavilion stands on the largest square in Lyons—the Place Bellecour—and the time chosen for the opening of the child welfare show immediately follows the sample fair.

The Red Cross Child Welfare Exhibit is scheduled to run three weeks. During the sample fair the later exhibit will be extensively advertised. As thousands of merchants come to Lyons from all over France, as also from the other allied countries and from neutral countries, the Exhibit is bound to be brought to the attention of France, and Europe generally.

A force of experts on child welfare is already at work in Lyons preparing the various features of the Exhibit. The site is an excellent one, consisting of two rectangular rooms, over 300 feet by nearly 100 feet. Around the walls are booths. One portion of one of the rooms will serve as a lecture hall, where popular talks will be given on the care of the child, audiences of three hundred to four hundred being easily accommodated. In another portion of the pavilion a continual moving picture show will be open free to the public. The best educational films of France, England and the United States have been especially adapted for the purpose. Thousands of people will daily see the Hygiene of the Child, the Fly Danger, Methods of Averting Tuberculosis, Dental Hygiene, Motherhood, Breast Feeding *vs.* Artificial Feeding, etc. Arrangements are being made to bring 50,000 school children to the Exhibit.

One part of the central space will be given over to an exhibition playroom. American specialists in kindergarten and playground work are already at Lyons training groups of children from among the little repatriates, aided by the American Red Cross, and children from Lyons orphanages. In the booths round the walls, each 12 feet square, will be specially arranged exhibits illustrating children's hospital equipment, the right kind of cribs and layettes, a baby's clean home, and a baby's dirty home. There will be a bookstore where literature on child welfare will be shown, and pamphlets, postcards, etc., distributed to the public.

There will also be in these booths graphic representations of work done by charitable and governmental institutions, such as the consultation at clinics for nursing mothers, creches, children's hospitals, the so-called "Mutualites Maternelles," and the French committees serving the repatriates who arrive at Evian, not far away. One booth will be devoted to illustrating what are the French laws—many of them model laws of their kind—affecting the child and the mother.

THE AMERICAN RED CROSS IN THE MEURTHE-ET-MOSELLE

By Maynard Ladd, M.D. (Boston)

Major and Assistant Chief, Children's Bureau, American Red Cross

Paris, France.

The story of Toul is the story of the development of the civilian work of the American Red Cross in the department of the Meurthe-et-Moselle. The little walled city, surrounded by some of the most formidable fortifications in France, has never in times of peace been a place of great importance. In times of war, however, Toul always figured largely in the events of the day, and has proved the backbone of the defense of old Lorraine. Now, in the fourth year of the war, when America enters the world's struggle and seeks through the activities of the American Red Cross to show to the French people the depths of its admiration and sympathy, we find that Toul has become the center about which all the civilian relief work naturally groups itself.

ENVIRONMENTS NEAR TOUL

From the top of the hill of Dommartin, on which our barrack hospital rests, one sees a wonderful expanse of country. The city of Toul rests in the valley at our feet deep moated, high walled, its great cathedral rising like a mighty sentinel in the midst of quaint and ancient gray stone houses. Fort St. Michel, a miniature Gibraltar, towers higher than our hills, higher than the great cathedral, its guns pointing up the valley where, some kilometers away, rest the khaki lines of America's first army in France. A little to the right one sees the hangars of a former French aerodrome, now occupied by the first squadron of American aviators. Some of us were fortunate enough to witness the first clash of hostile planes with our own, when Campbell of Harvard and Winslow of Yale turned the tables on an overconfident and arrogant enemy. Still further to the right are the great automobile repair shops of Jean d'Arc, and one knows that over there beyond the hills are other aviation camps, military hospitals and munition factories. In other words, we are the center, geographically, of a place teeming with military and industrial activity, but from all of these we are so removed from Hun objectives that it is unlikely that their bombs will drop on our twenty or more red-crossed roofs by accident. If the Boche comes by design for purpose of reprisal, it matters little to them whether we are on the top of our little hill, or 10 or 15 miles farther from the front. From shell fire we are protected by an obstinate and efficient line of boys from home, flanked by the sympathetic and indomitable poilu. Here at Toul we find the strategic center from which our work naturally radiates out into every corner of Lorraine; from Pont-a-Mousson, where our dispensary is within fifteen minutes' walk of the trenches, down along the battle line to Emeville, where American blood was first shed in France, and farther still to Epinal in the Vosges.

OBJECTS OF OUR WORK

There are two ideas underlying our work at Toul. There is the medical and civilian work for the relief of suffering among women and little children deprived by war of their own doctors and hospitals. Then there is the effect of this work on the morale of the people, and so indirectly on the army. A poilu was fighting in the trenches when his wife's letter told him of the illness of his child. He secured "permission" and hurried home, but long before he got there we had the child comfortably stowed away in a hospital cot at Toul, and when he finally came to us the child was well. The grateful poilu thanked us with tears in his eyes and said that now he was not worried about his family he could go back to the trenches with a light heart and ready for any chance. This is typical of many cases, and with the extension of the work, following a broad, comprehensive plan of operations, the American Red Cross is going a long way to do for the community what it did for the individual poilu; it is relieving the people of worry which comes from trying to carry too heavy a burden. It does not take a psychologist to gauge the effect of such relief, if effectively and extensively applied, on a population that is trying to maintain the industrial activities of their region in the face of nightly raids from avians and the more insidious but equally potent propaganda which filters through from Hun lands.

EARLY HISTORY OF OUR ORGANIZATION

The early history of Toul has been told many times. Briefly, the work started by the joint efforts of the American Red Cross and the American Fund for French Wounded had its origin in an effort to give homes to the children in the munition towns about Nancy whose houses had been destroyed by bombs, and yet whose parents must remain to work in the usines.

Coöperating with M. le Prefet Mirman and the French civil and military authorities, the newly erected military barracks at Luxembourg Dommartin, Toul, became the seat of the present Asile Caserne du Luxembourg. The development and management of this institution was one of the very first undertakings of the newly formed Children's Bureau of the American Red Cross under Dr. William Palmer Lucas, chief. On August 17, 1917, Dr. J. P. Sedgwick took over permanently the temporary organization which had been effected by Mrs. Lathrop of the American Fund for French Wounded and Mr. Roebrt Davis and staff, and which had been directed by Mr. MacCormick. He was assisted by Dr. N. O. Pearse of Minneapolis and Dr. Douglass Durand of Seattle. On December 1, 1917, Dr. Sedgwick and his staff was succeeded by the writer, assisted by Drs. Karlton G. Percy and Robert G. Sharp of Boston. To the new management was given the directorship of the medical civilian relief in the whole department of the Meurthe-et-Moselle.

ESTABLISHMENT OF REUGEE HOMES

The Asile Caserne du Luxembourg has at present accommodations for 550 refugees. These are for the most part young children. There are about thirty-five mothers. A school for the older children and an Ecole Maternelle for the little ones is provided by the French Government. The care of the children is under the direction of Miss Stotend, assisted by French aides. Classes in sewing and manual training have been established and gardens laid out for each battement, to be worked by the children, in healthy and instructive competition with each other. In the reorganization of the refugee department we have had the invaluable assistance of Mr. R. R. Reeder, chief of the New York Orphanage. The children are well fed and well clothed, and the general health of the group may be understood when one states that over 500 children have been cared for over a period of nine months with no illness so serious as to result in death.

ESTABLISHMENT OF THE HOSPITAL

The hospital at Toul had its origin in the necessity of providing an infirmary for the refugee children who became ill and for the very small runabouts who needed more individual care than could be given them in the battements. Under the new management, this infirmary has been increased to a medical and surgical hospital for children of women of 200 beds, of which 40 are reserved for maternity cases. This hospital has become the medical center for the whole department, a place to which the sick poor may be taken, as they are searched for and found by our system of dispensaries and social workers. It is at present under the immediate control of Dr. Sharp, assisted by Dr. Lowe, to whose efficient work all credit is due. The 160 beds are in surgical operation. Forty ether operations a week represent its present surgical activity. There are thirty-six patients in the maternity wards. We operate an ambulance service, collecting patients from many different parts of the district, and not a day passes that we do not have the pleasant experience of receiving patients many of whom have walked or been carried many kilometers that they may be cared for by the American physicians.

HEALTH CENTERS

By an harmonious and effective working agreement with the American Fund for French Wounded, the American Red Cross has developed an extensive system of dispensaries and health centers. Along the course of the Meurthe and the Moselle rivers are many large manufacturing towns, devoted at present to the production of munitions of war. These towns, incapable of expanding readily to meet the increased demand on them, are crowded in many places to double their normal capacity, largely by women workers who of necessity bring with them their children, whose fathers are in the trenches. It is in such towns that the need arises for increased medical care and supervision, more especially as the inadequate civil hospitals have for the most part been closed or commandeered by the militaire and the civilian doctors reduced to a totally inadequate minimum. It is in just such places that we are establishing the joint dispensaries of the American Red Cross and American Fund for French Wounded.

PLAN UNDER WHICH THE WORK IS CONDUCTED

The scheme under which the present management, ably assisted by Dr. Percy, from which the needs of surrounding towns may be met by organized clinics and is working, is as follows:

Base dispensaries are established in some central town of industrial importance, from which the needs of surrounding towns may be met by organized clinics and district visits. A dispensary "unit" consists of a physician, an experienced head nurse with one or two aides, an automobile and a driver. The "unit" lives at the base. Suitable quarters for the clinic are obtained from the civil authorities, generally free of rents. A base of supplies is organized, and clinics are held generally two or three times a week in the larger towns, rarely once a week in the smaller places. Each base dispensary will average about five subdispensaries, but the number of towns reached by this system is, of course, much larger, as people come to us from hamlets and villages from a larger radius. The clinics generally average between thirty and thirty-five, but sometimes run as high as eighty. In character they are essentially the same as those we see at home, with a much larger percentage of skin and vermin disease.

These dispensaries serve the means by which we get a line on the really sick and surgically needy children in the community. They are the sources from which we recruit our patients for the hospital at Toul. They also serve as a center for the distribution of civilian relief in the way of clothes and food. In the latter respect great care is taken not to distribute charity in a wholesale or socially demoralizing manner. Our procedure is to make an applicant fill out a blank stating the number of adults and children in the family and the total wages or allocations of each one. This is then submitted to the sous-prefet or maire or a committee appointed by one or the other, and the claims investigated and approved. If just, relief is afforded according to a regular scale depending on the number of children and the total income of the family.

We also secure through the dispensaries names of many expectant mothers. To each of these we give a layette and enroll her for prenatal care and later for a healthy babies' clinic. Often we will take a mother and all her children to Toul, placing the children in the refugee home and the mother in the hospital, for a period of a week or ten days previous to labor and for two weeks afterwards. When a mother leaves the hospital her baby's case record is sent to the doctor of the nearest dispensary and the mother is told to report there regularly. We are trying so far as we can, with limited resources and under great difficulties of conveyance, to follow up those who neglect to keep in touch with the clinic.

Base dispensaries such as I have described are now in operation at Toul, Foug, Nancy, Neuf-Maison, Luneville, Gerbervillier and Epinal. The number of subdispensaries is constantly increasing, and the area reached is ever widening.

ASSISTANCE AFFORDED BY INDUSTRIAL CORPORATIONS

We are making a great effort to secure the interest and even financial assistance of the directors of the usines in all this work. Often the rooms for the clinics are furnished to us by them and in certain places they have coöperated to the extent of making financial grants. At Epinal, for instance, each of the two usines has contributed 3,000 francs for a creche for nursing mothers, to be situated near the factories, and have agreed to arrange the hours so that the mothers may leave their work at intervals to nurse their babies. At Foug, M. Cavalier, director of the Fonderie de Foug, has given us the land, labor and material for a new hospital and dispensary; the American Red Cross furnishes the heating plant and equipment. So by securing their interest and coöperation now, by acting always in consultation with the prefets, sous-prefets and maires we have in mind not only the immediate practical effect of their assistance, but the prospective weight of their influence to continue after the war these practical measures of health and social relief work.

MATERNITY SERVICE

In the maternity hospital of forty beds, founded as an emergency measure, in twenty-four hours, owing to a bombardment of the Maternite at Nancy, we are trying to establish a maternity service on a higher basis than usually obtains when a system of midwifery predominates. We are making the service as perfect as circumstances permit, trusting that the example may, as leaven, exert its influence much further than would be indicated by the size of the hospital. We have found the French mothers very receptive to American methods, and even the pupil midwives, whom as an experiment we incorporated into our nursing staff, have shown the greatest enthusiasm for their work under the new conditions. More than half of our nursing "aides" are young French women to whom we are giving training in American methods. These will form a nucleus around which to build a nursing force for the continuation of the better part of our work when in course of time it is necessary to withdraw the American nurses' aides.

ATTENDANCE CONSTANTLY INCREASING

The attendance at our hospital and dispensaries and clinics is constantly increasing. The need for physicians and nurses grows with each new project successfully launched. Already we have reached a record of 2,000 consultations a week. There is a field for further extensions of this kind of work, in which we have so far had the unqualified support and sympathy of the French medical, civil and military authorities.

COUNCIL OF NATIONAL DEFENSE, COMMITTEE ON MEDICINE

By Colonel FRANKLIN MARTIN, M.D.

Chairman and Sanitation Officer of the General Medical Board and Member of the Advisory Commission of the Council of National Defense.

Organization.—The National Defense Act of June 3, 1916, created the Council of National Defense and the Advisory Commission.

The Council was composed of six members of the President's Cabinet: the Secretaries of War, Navy, Interior, Agriculture, Commerce, and Labor. The Council nominated and the President appointed an Advisory Commission of seven especially qualified persons, each having knowledge of one great field. The General Medical Board, composed of representative medical men, was organized for the purpose of aiding in the enormous expansion of the various Government bureaus and of coördinating with their work the resources and talent of the civilian medical profession. The board thus represented the civilian medical population in its relation to the four Government administrative offices of the Surgeons General of the Army, Navy, and Public Health Service, and the Red Cross, and through it the organization for war of the medical profession was carried out.

Medical Mobilization.—In the winter of 1916, when the necessity for a greatly enlarged military establishment became apparent in view of the possibility of this country entering the war, the Committee on Medicine of the Council of National Defense directed its energies to formulating plans for mobilizing the medical profession for service in the Medical Departments of the Army and the Navy. From a membership of approximately 1,800, including men beyond the military age, and those physically ineligible for active field duty, the Medical Reserve Corps was increased to 21,000 by the end of the first year. At the time of the armistice, November 11, 1918, 30,144 physicians from civil life were in the service of the Army.

Committee on Standardization.—Because of the impending enormously increased demand on manufacturers of medical and surgical supplies to meet military needs, the Committee on Standardization was authorized February 2, 1917, for the purpose of standardizing essential medical and surgical supplies and equipment, and to increase speed and reduce cost of production. This committee included in its membership representatives of the Army, Navy and Public Health Service, and American Red Cross. Various subcommittees representing the medical specialties and manufacturers were appointed. With the hearty coöperation of the manufacturers, who gave freely of their time and willingly adapted their facilities to Government needs, the result was an increase in the production of staple articles sufficient to meet the increasing requirements of the Army and Navy. Four catalogs of staple medical and surgical instruments and supplies were prepared and issued by this committee.

The Drug Division conducted an investigation of medical products for the Office of the Surgeon General of the Army and the Bureau of Medicine and Surgery of the Navy. In coöperation with other departments, inquiries were made into shortage of important drugs, the conditions being relieved in the majority of instances upon the organization of the War Industries Board (q. v.). This committee was continued by the Section of Medical Industries of the Board.

General Medical Board.—On April 2, 1917, the Chairman of the Committee on Medicine nominated, and the Secretary of War appointed, a representative group of medical men to serve on the General Medical Board. An Executive Committee was appointed by the Chairman to pass upon all matters brought before the larger body for consideration. The executive committee was composed of Surgeon General W. C. Gorgas of the Army, Surgeon General W. C. Braisted of the Navy, Surgeon General Rupert Blue of the United States Public Health Service, Rear-Admiral Cary T. Grayson, U. S. N., Franklin Martin, M. D., Chairman of the Committee on Medicine, F. F. Simpson, M. D., W. J. Mayo, M.D., C. H. Mayo, M. D., Victor C. Vaughan, M. D., and W. H. Welch, M. D.

In line with the general policy of the Government to secure the best talent available in all lines of activity for the care and welfare of the Army then in process of formation, committees representing every specialty in medicine were appointed by the General Medical Board. The committees were composed of the leaders in their respective specialties and representatives of the governmental medical departments.

These volunteer workers met at frequent intervals and in their advisory capacity laid down the general scientific program which was followed by the Government medical bureaus in the conduct of their activities during the period of the war. Shortly after their organization many of these committees were gradually absorbed by the executive bureaus of the Government and their work continued as working components of the military machine.

By this plan American doctors were enabled to work in the army in line with their civil experience for the first time in history.

Committee on Combating Venereal Diseases.—One of the most important and far reaching contributions of the General Medical Board toward the successful prosecution of the war was its active interest and energetic assistance in the work of its Committee on Civilian Coöperation in Combating Venereal Diseases. An educational campaign for national support of the social hygiene program was inaugurated through the distribution of circulars and circular letters; joint conferences of medical and lay citizens, coöperation with advertisers and press association committees; communication with governors of all the states by wire and letter, urging recognition of the emergency and drastic action in dealing with venereal diseases; suggestions to state boards of health as to measures essential to a successful campaign; appeals to pharmaceutical associations and boards of associations and boards of pharmacy to eliminate advertising and sale of venereal disease nostrums; and requests to mayors of a thousand cities and towns, especially in the vicinity of camps, to enforce existing laws and to enact necessary legislation. Many lecturers were sent out, and editors of health bulletins and labor journals were kept informed regarding the progress of the campaign. Extensive use was also made of the cinematograph and "movie" pictures proved to be very popular and instructive.

Committee on Dentistry.—Within a year after the United States declared war against Germany the number of dental officers was increased in the Dental Corps of the Regular Army from 58 to 209, in the National Guard to 259, and in the Dental Reserve Corps to 5,196—a sufficient number to supply the quota permitted by law for an army of 5,664,000 men.

In the rapid development of the dental service, all credit is given to the patriotism of the members of the dental profession, the various preliminary dental examining boards, dental faculties, dental manufacturers, and officers and members of the Preparedness League of American Dentists. The official record showed 613,285 gratuitous dental operations performed by the members of the last named organization. This organization was also largely responsible for the three dental motor-car ambulances presented to the Surgeon General of the Army.

The Committee on Dentistry coöperated with the deans of dental schools and arranged for the enlistment of dental students in the Enlisted Medical Reserve Corps and their assignment to the inactive list. A survey of dental and oral hospital physicians was made. Improved courses in the Army and Navy Medical Schools for Army and Navy dental surgeons were recommended. A school of instruction for dental officers was opened March 15, 1918, at Camp Greenleaf, Fort Oglethorpe, Ga.

The United States was, thus, the only country giving extensive training in military and professional subjects to dentists, and this nation had a greater number of dental officers subject to military call than all other allied nations combined.

In coöperation with dental manufacturers, dental instruments and supplies were standardized.

Editorial Committee.—With the idea of being of immediate and direct benefit to the largely increased numbers of medical officers who had not had military medical experience, the General Medical Board authorized the Editorial Committee to proceed with plans for the publication in pocket manual form, of text books epitomizing the surgical and medical experience acquired in the war up to the time of going to press, and written by men especially qualified by training and by war experience eight of these manuals were prepared.

Committee on Hospitals.—Through the efforts of the Committee on Hospitals the general hospitals of the country were reorganized in order to release for military service as many as possible of the members of their staffs.

The hospitals were classified as to size, convenience to railroads, facilities for expansion, and equipment for handling special work. The various special, private, and convalescent hospitals, sanatoria and dispensaries were inventoried, and the various phases of the hospital needs, present and presumptive, were investigated.

Committee on Hygiene and Sanitation.—The efforts of this committee were largely directed to questions concerning the combating of venereal diseases and the control of the sale of alcoholic beverages within the camps and extra cantonment zones. It also concerned itself with the problems of drug addiction, public health nursing, tuberculosis and health statistics.

Committee on Industrial Medicine and Surgery.—This committee, which was organized on January 28, 1918, included in its membership representatives of the Departments of Agriculture, Commerce, Interior, Labor, and the United States Public Health Service, and of industry, manufacturers, and the medical profession.

The committee recognized that the state of war made it imperative: (1) to provide against unnecessary human waste in industry and society during the war; (2) to offset the drain on industry of man forever caused by the raising of military forces; (3) to meet the need for greatly increased production; (4) to avoid preventable deaths and disabilities from accident and disease; (5) to restore to full producing power in the shortest possible time sick and injured workers; (6) to increase output by keeping workers in good health; (7) to provide healthful places in which to work; (8) to provide healthful homes and communities in which to live; (9) to meet shortage of medical service inducted by military needs. A program was outlined along these lines, which, upon the recommendation of the Council of National Defense, was referred to the U. S. Public Health Service for execution.

Committee on Legislation.—The Committee on Legislation interested itself at the outset in the safeguarding of troops from vice in the zone around camps and cantonments, section 13 of the Army bill of 1917 being the result of its activities in this direction.

Through this committee the authorities were induced to provide for the enlistment of medical students of recognized schools in the enlisted Medical Reserve Corps, thus while not exempting them from military service, allowed them to finish their course.

Through the efforts of the Committee the Federal Trade Commission granted licenses to American concerns to manufacture salvarsan and other German preparations.

As a result of the activities of this committee supported by the General Medical Board and State and County Committees of the Council of National Defense legislation was enacted on June 30, 1918, as part of the Army Appropriation Bill, placing the Medical Department on the same footing in regard to rank as the other branches of the Army.

Committee on Nursing.—Through the Committee on Nursing, with a subcommittee on Public Health Nursing, a comprehensive survey of the nursing situation of the country was made for the benefit of the Army, Navy, Public Health Service, and American Red Cross. A campaign was inaugurated to interest young women in nursing as a career and to enlist trained nurses for duty with the fighting forces.

The committee championed the cause of securing rank and increased pay and allowances of nurses.

A plan was inaugurated whereby students might be supplied to the training schools, thus relieving the pressure of responsibility which fell of necessity upon the senior students in training. The plan, carried out through the state and local divisions of the Woman's Committee of the Council of National Defense, included the recruiting of candidates and their assignment to the schools which expressed a need for students.

Many other activities were inaugurated by the Committee on Nursing, all looking to the betterment of the nursing facilities of the country, the fullest utilization of nursing material, potential and actual, and the securing of the comfort and improving the status of nurses.

Committee on Research.—The Committee on Research conducted its activities in coöperation with the National Research Council. The committee investigated, through the laboratories available for its purposes, the vast number of medicinal preparations and appliances submitted to the Army and Navy for adoption by private individuals and firms.

A report was made to the departments interested, with recommendations as to the adoption or rejection of the given product or appliance.

Committee on State Activities.—Upon its appointment, in April, 1917, this committee with the assistance of the state and county committees of the Council of Defense, concentrated its efforts primarily upon supplementing the activities previously initiated by the Committee on Medicine to increase the enrollment of medical men throughout the country in the Medical Reserve Corps.

The committee coöperated with the Committee for Civilian Coöperation in Combating Venereal Disease; it indorsed and recommended that state and county committees support the bill for increased rank for medical officers in the Army and for those engaged in various other lines of coöperative work.

Committee on Surgery, with Subcommittees on Ophthalmology and Otology, Rhinology and Laryngology.—Upon the recommendation of the Committee on Surgery, the records of the members of the Medical Reserve Corps were classified according to professional and military qualifications and this information supplemented by confidential information as to ability for certain appointments in the military service. This information was transferred to code cards, one set remaining in the offices of the Council of National Defense, and two sets being forwarded to the Surgeon General's office, one for retention there, the other sent to General Pershing's headquarters in France.

The subcommittees on surgical specialties coöperated with the Committee on Surgery. An exhaustive study was made of the ear protectors, in order to ascertain the best protectors for use in the service. Tests were made and a report submitted to the Surgeon General. A report was also made to the Surgeon General regarding the reconstruction of defects in hearing and speech.

In July, 1917, the two subcommittees met together as a Committee on Head Surgery. This joint committee recommended special hospitals for the treatment of eye, ear, nose and throat cases, and prepared plans for special hospital and dispensary buildings in cantonments. It was also recommended that specialists trained along certain lines be assigned to special duty in military hospitals. It was further recommended that for each group of several general hospitals there should be a head hospital, with one brain surgeon and four assistants; one chief ophthalmic surgeon with two assistants; one chief nose and throat surgeon and four assistants; and that four ophthalmic and six ear, nose, and throat surgeons be assigned to each division of the mobile forces. These recommendations were practically all adopted by the Surgeon General in the organization known as the Head Surgery Division, S. G. O.

Committee of Women Physicians.—The Committee of Women Physicians made a comprehensive survey of the women doctors of the country, of whom the census taken showed 5,969, 5,788 being in active practice. Indorsed lists of anesthetists, laboratory workers, radiographers, and sanitarians were prepared with the assistance of experts in each line. Women physicians were recommended by this committee for service as Contract Surgeons in the Army, for duty with the United States Public Health Service, and to fill places in institutions and communities left vacant by the demand for men doctors in the military service. See also Women in the War.

Committee on Child Welfare.—At a preliminary conference attended by 21 representatives of various organizations, educational institutions, and governmental bureaus interested in child welfare, the following recommendations, many of which were acted upon, were made to the Council of National Defense:

(1) That public health nursing be officially recognized as war service.

(2) That special effort be made to enlist college and high school graduates for hospital training courses.

(3) That volunteer aids for public health nurses be properly trained.

(4) That all communities be urged to stimulate activities pertaining to infant and child welfare.

(5) That special provision be made to keep the mother and her young children together in the home.

(6) That there be special supervision to day nurseries.

(7) That rigid enforcement of child labor laws be recommended.

(8) That the Government be asked to assure adequate support for soldiers and their families.

(9) That inquiry be made as to the need among the allied nations for maternity care and infant and child welfare work that could properly be performed by Americans.

(10) That a national committee on child welfare be organized, including representatives of interested organizations.

Committee on Reëducation and Rehabilitation.—As a result of the recommendations of this committee a plan for the formation of a reconstruction board was presented to the Secretary of War. A conference was called in Washington on January 14, 1918, to which representatives of the departments interested were invited, for the purpose of formulating a definite plan of action. A bill providing for the vocational rehabilitation and return to civil employment of soldiers and sailors disabled in the line of duty was drafted, but was not submitted to Congress. The passage of the Smith-Sears Act on June 27, 1918, placed the supervision of the reëducation in the hands of the Bureau of War Risk Insurance and the Federal Board for Vocational Education.

Volunteer Medical Service Corps.—The Council of National Defense, upon the recommendation of the chairman of the Committee on Medicine, authorized and directed the committee to organize the Volunteer Medical Service Corps, to be composed of physicians ineligible for appointment in the Medical Reserve Corps on account of age (over 55), physical disability, or civil or institutional needs, and women physicians. The scope of the Volunteer Medical Service Corps was later enlarged to include every physician in the country not already in Government service. An intensive campaign for enrollment, initiated in September, 1918, brought nearly 60,000 applications for membership before the end of October, the physicians pledging themselves to place their services at the Government's disposal to perform any duty assigned to them.

The information furnished on the application blanks was transferred to code cards, making available on short notice all information in reference to each applicant. These code cards are now filed in the Surgeon General's library, and the information thereon is accessible to any of the Governmental departments which may have occasion to make use of it.

In addition to the more conspicuous activities of the Committee on Medicine outlined above, many impromptu conferences and committee meetings were held for the consideration of specific matters on which the executive departments desired recommendations, and thousands of communications were addressed to the physicians of the country, executives of hospitals and medical schools, nurses, dentists, and manufacturers of medical, surgical, and pharmaceutical supplies, in the prosecution of the war program by the committee.

THE AMERICAN MEDICAL ASSOCIATION'S WAR SERVICE

THE American Medical Association is the comprehensive organization of the medical profession of the United States. It is non-sectarian, including in its membership legally qualified practitioners of medicine, without regard to the medical school from which they graduated, who do not support or practice or claim to practice any exclusive system of medicine. This membership is composed of the more than 81,500 members of its "constituent state associations" in the 48 states and in the District of Columbia, Hawaii, the Isthmian Canal Zone, the Philippine Islands and Porto Rico. The unit of organization is the component county medical society of which there are over 2,000. Each member of these county branches has equal rights and responsibilities in the organization which he exercises himself or delegates to elected representatives. The county units in each state or territory unite in the constituent state association for that jurisdiction which is governed by a House of Delegates, the members of which are the representatives elected by its several component parts. In turn, these delegate bodies of constituent state branches select those who represent them in the House of Delegates of the American Medical Association, its governing body.

In a word, in the American Medical Association, the United States Government had a thoroughly democratic, non-sectarian, voluntary organization of physicians which included specialists in every branch of medicine as well as general practitioners and in which practically two-thirds of the legally qualified active practitioners of medicine in the country held membership.

Facilities.—When the United States recognized that a state of war with Germany existed, the Association already had tendered its organization and its facilities to the Medical Corps of the Army, of the Navy and of the U. S. Public Health Service to coöperate in every way for the winning of the war.

These facilities are unique. They include information regarding the members of the medical profession which was not to be found elsewhere. This information consists of complete records of the membership of the organization; in fact, of all licensed physicians and of other medical data compiled from various sources, including matters relating to the professional and social standing of individual physicians. Especially, at the Association headquarters, there are:

(*a*) A card index record of all medical students of the United States showing their preliminary education, the medical schools which they are at present attending and the schools at which each of the years of the medical course was taken. This covered the seven years preceding the war.

(*b*) A biographic card index of physicians giving, in addition to the student record, information concerning the school of graduation, licenses held, hospitals in which they have served as interns, the places at which they have engaged in practice, etc.

(*c*) A record of the membership of recognized special medical societies and associations, as well as the names of those who have registered in the various sections of the Scientific Assembly of the American Medical Association. These records provide information regarding the specialty in which each physician is interested or to which he limits his practice. This information is supplemented by statements from physicians themselves regarding their specialty. These data were available and were valuable in making selections of men for any special or particular service.

(*d*) A personal file containing a vast amount of personal information concerning physicians in the form of newspaper clippings and reports from various sources. It had been assembled during the twelve years preceding the war.

(*e*) A file in the Propaganda for Reform Department of the *Journal* containing a most complete list of quacks, irregular practitioners, cults, 'pathies, etc. This file was begun in 1907.

It will be appreciated that the Association had just the data needed by the War Department to show the general character, education and standing of the individual both as a physician and as a man, and this information was made available to and was utilized by the Surgeon-General of the Army.

The Personnel Division.—From the beginning of the war, the Personnel Division of the Surgeon-General's office, as a routine procedure before taking action on the applications, forwarded to the American Medical Association the names of applicants for commission in the Medical Reserve Corps, thus availing itself of the Association's records. These names were forwarded almost daily, often over a hundred a day. When received, the names were card indexed and the cards distributed among specially trained clerks who looked up the information concerning each individual. If any data were found which called in question the professional or personal character of any of these applicants, the information was transmitted to the Surgeon-General. In addition to these routine investigations, special investigations were, on request, made by the Association officers. These were conducted by asking the president and the secretary of the county medical society (within whose jurisdiction the subject of the investigation resided) and one to four other physicians of known professional standing in that community, for data concerning the physician about whom information was requested; if necessary. These requests were repeated, or additional letters were sent to others. Then when three or four responses were received at the Association's headquarters they were assembled and the information forwarded to the Surgeon-General's Office.

War Work of the Journal.—War was declared April 6, 1917. The *Journal* for April 7 contained four editorials in which it was stated that war was certain. These editorials emphasized the needs of the Army and of the Navy for medical officers, and called on the medical profession to be ready to respond. The following week it published the facts relative to the number of graduates available from medical colleges, and emphasized the importance of maintaining the supply of physicians through the medical schools. In the *Journal* for April 21, 1917, a call was issued to the profession of the United States, through the county societies, to supply the Army with medical officers. In that issue were printed 65,000 blank forms for making application for commission in the Medical Corps, as well as in the Medical Reserve Corps; and the announcement was made that the Association was prepared to send pamphlets, circulars and other information regarding the medical service of the Army and of the Navy.

In addition to other information regarding the Reserve Corps, the *Journal* on April 28, 1917, published the first list of medical examining boards. On May 26 it again published application blanks—this time 67,000. (Incidentally, within two weeks, 1,300 applications were received in the Surgeon-General's Office on blanks taken from the *Journal.*)

From this time the *Journal* carried on a propaganda to build up the Reserve Corps, and in other ways to coöperate with the Surgeon-General's Office of both the Army and the Navy.

Especial mention is made of the "Medical Mobilization and the War" department of the *Journal.* This first appeared in the issue for April 14, 1917, and in each succeeding number during the period of the war. It included a great variety of medico-military articles.

One of the announcements which was of most effect in stimulating volunteers for the Medical Corps, was that listing the names of physicians who accepted commissions. The first of these lists appeared in the issue for June 2, 1917, and others were published practically each week thereafter throughout the period of the war. Not infrequently the announcement of duty which accompanied the names in these lists was the first notice of his "orders" which was received by the medical volunteer.

In connection with this work there naturally was a large amount of correspondence. Since the beginning of the war the Association officers answered, both by letter and by publication, thousands of questions relative to the service, thus relieving the offices of the Surgeon-General of this burden. Besides the application forms (132,000) contained in the *Journal* the Association printed and sent out about 135,000 additional forms, or a total of nearly 267,000.

Direct Personal Appeal to Physicians.—In May, 1917, a proposition was submitted to the Surgeon-General of the Army providing for a personal appeal to all physicians under 55 years of age. The plan was endorsed by the Surgeon-General, and Major J. R. McKnight of the Medical Corps was assigned to the Association office to represent the Surgeon-General and to supervise the work. The work was begun on May 28, 1917, and completed about the end of October. The Association, in addition to supplying biographical data from its files and records, did the necessary printing connected with the work and furnished other facilities. However, this work was conducted ostensibly by the Central Division of the War Department, in Chicago, which means that the Association's part in this enterprise was unknown.

The proposition as outlined, and as carried out, required the sending of a circular letter to every physician on the Association list under 55 years of age. This letter presented the privilege of applying for a commission in the Medical Reserve Corps, and was signed by Major McKnight as representing the Medical Corps. A card was enclosed—with a return franked envelope—on which the recipient was asked to give certain information regarding himself; for example his social conditions, and especially whether he would apply for a commission at that time, or later—in the latter case, when? An application blank and all the necessary information, including a list of examining boards, also was enclosed. To those physicians who did not answer a second letter was addressed. All told—including the first letter and the "follow-up"—68,597 letters were sent out; and up to the time Major McKnight was relieved from this duty returns had been received from 34,479 physicians.

In his final report to the Surgeon-General, Major McKnight said:

> In following this work and noting the number of applicants for commissions in the Medical Reserve Corps, we have seen a marked increase in these applicants reported from the different states immediately following the mailing of letters to the physicians of those states. This increase was noted to follow the mailing of both the first and second letter.
>
> This work, which has been conducted in connection with the American Medical Association and in coöperation with Major Geo. H. Simmons, will be completed in a

few days, with the exception of the delayed replies and certain letters of inquiry on subjects related to the Medical Reserve Corps. . . .

The American Medical Association has not only placed its files at our disposal for this work, but has rearranged its card system from time to time for our convenience, has furnished all materials other than the franked envelopes, has done all the printing, and has rendered every possible assistance in a most admirable manner.

In addition to this effort to increase the Reserve Corps, the Association's plant printed a large amount of material without cost to the Government. Besides the 270,000 application forms already mentioned, the following items are cited: 5,500 reply post cards for a survey of medical students relative to their relationship to the selective service law; 85,000 circular letters regarding the Medical Reserve Corps; over 120,000 lists of Examining Boards for Medical Reserve Corps applicants; 140,000 envelopes for use in circularizing physicians; 85,000 reply cards; over 60,000 circulars giving information concerning the Medical Reserve Corps; over 26,000 miscellaneous pamphlets and circulars relating to the mobilization of the National Army and especially of the medical profession. In a word, from the beginning of the war all the facilities of the Association, including its biographical information, its printing plant—everything—were at the disposal of the Surgeon-General's Offices, and every aid possible was rendered.

Surgeon-General's Appreciation.—As regards this point, the following letters from Surgeon-General Gorgas, dated February 22, 1918, bear witness. The first is addressed to the chairman of the Board of Trustees; the second, to the Secretary of the Association:

THOMAS MCDAVITT, M.D.,
Chairman Board of Trustees, American Medical
Association, St. Paul, Minn.

DEAR DOCTOR MCDAVITT:

In answer to your letter dated February 14, 1917, I am very glad to acknowledge the great service which the American Medical Association has given, with and without solicitation, to me personally and to the Office of the Surgeon-General, in the solution of the important problems of preparedness for war and of the medical and surgical care of our boys in training camp and field by the Medical Department of the Army.

Through the officers, the *Journal* and educational propaganda distributed by the American Medical Association, we have secured thousands of officers of the Medical Reserve Corps. The Office of the Surgeon-General and the Medical Department of the Army still need your aid and support.

Permit me to thank you and through you the other trustees and officers of the Association for the valuable help already rendered and for the acceptable offer of a continued life service.

Very truly yours,
(Signed) W. C. GORGAS,
Surgeon-General, U. S. Army.

Dr. Alex. R. Craig,
Secretary American Medical Association,
535 North Dearborn Street, Chicago, Ill.

Dear Doctor Craig:

It gratifies and affords me pleasure to acknowledge the great services rendered by the American Medical Association, to me personally and to the Office of the Surgeon-General, in organizing the Medical Department of the Army for the efficient care of our soldiers in training camp and field.

Since April, 1917, the Board of Trustees, the officers at the Chicago headquarters, the *Journal* and all the machinery of the American Medical Association have been important and distinctive factors through which many thousands of physicians have been influenced to apply for commissions in the Medical Reserve Corps; medical officers have received valuable instruction by means of special articles printed in the *Journal* and also through literature distributed in pamphlet form from the office; and in other ways too great to enumerate here.

The spirit of service expressed by the officers and members of the American Medical Association in so many helpful ways, in the work of preparation for war and for actual surgical and medical care of our soldiers in war, evidences a patriotism and devotion to country which is a credit to the American medical profession.

I accept and thank you and through you the other officers of the Association for the offer to continue the same services of the Association to the Medical Department of the Army as long as may be.

Very truly yours,
(Signed) W. C. Gorgas,
Surgeon-General, U. S. Army.

Coöperation with Provost Marshal-General.—On October 13, 1917, on invitation of the Provost Marshal-General's Office, the editor of the *Journal* (Major George H. Simmons) held a consultation with Colonel Hugh S. Johnson (Judge Advocate and Executive Officer) and Colonel Easby-Smith relative to establishing medical advisory boards in connection with the carrying out of the selective service regulations. Major Simmons suggested that the proposition of the Provost Marshal-General be made in writing. This was done in the following letter, dated October 12, 1917:

Dr. G. H. Simmons,
Cosmos Club, Washington, D. C.

My Dear Dr. Simmons:

There is, in course of preparation, new regulations governing the draft. These new regulations put into effect a plan built on principles that constitute a radical departure from anything that has been done before. In brief, it is proposed to inquire into the economic, family, and industrial relations of every person liable to military service. This is to be done by means of an exhaustive questionnaire which every registrant is required to submit to his Local Board. On receipt of the questionnaires of all registrants, the Local Board will proceed to classify all registrants in five classes, arranged in the order of their availability for military service. Classes two, three, four and five are, for all substantial purposes, temporarily discharged from the draft. Class one, alone, is immediately available for military service. Class one is composed largely of single men, and those whose relation to industry and agriculture is such that they can be taken without disturbing the economic interests of the nation.

The question of determining the physical fitness of registrants is not the least of our difficulties. In the proposed scheme it would be futile and unwise to examine those registrants who are in deferred classes. Our problem, then, is to provide mmediately for the physical examination of Class one.

Under the plan for physical examination in effect for the first draft, an examining physician attached to a Local Board examined registrants before the list had been culled by exemption and discharge. If the examination resulted in a finding of physical disqualification, the registrant was reëxamined by another physician. If both physicians found him disqualified, he was ordinarily discharged from draft.

This system left much to be desired. Examinations were made most hurriedly in the absence of proper apparatus. Sometimes enormous personal pressure was brought to bear on the discretion of the physician, and while no single case of improper conduct has arisen, it is not in the nature of things that, in the close relation between local physicians and their clientele, impartial consideration was not in some instances clouded. The system is not fair to the examining physician, nor to registrants, nor to the Government.

It is proposed to cure this fault. It is planned to establish Medical Advisory Boards, not necessarily integrated with the territorial jurisdiction of either Local or District Boards but having headquarters with sufficient apparatus and conveniences so located as to be accessible to boards in the portion of the state in which Advisory Boards are situated. Any case in which the local examining physician has held the registrant disqualified for service (unless the disqualification is obvious) or in which the local physician is in doubt, or in which the registrant feels aggrieved by the decision of the local physician, or where the Local Board or the Government Appeals Agent desires to appeal the findings of the local physician, is to be sent to the Medical Advisory Board for an exhaustive reëxamination on which the Local Board can proceed to a final determination.

We are going to strive to give this great sifting and classification of registrants definition as a national effort in the accomplishment of which we hope to have the President call upon every citizen to assist according to his qualifications and talents. Our problem as to the Medical Advisory Boards is, I think, one of organization. The system of Advisory Boards must, if it is to be effective and if it is to be given an official status, be 100 per cent perfect. In order to accomplish this it is necessary to have at each state headquarters some person, I think a physician, who will be responsible for the prompt, scientific and efficient organization of the state. His problem will be to consider the transportation difficulties, to locate an Advisory Board in places within his state where there are proper apparatus and conveniences, to select and to recommend to the governor, or it may be to the President, the personnel of each of such boards. In short, he must envision his state as a system, and must create the working boards of that system. It has been suggested that a physician in the Medical Reserve Corps in each state should be called in active service, given an official status in supervision of Medical Advisory Boards, and possibly of local examining physicians within the state. I like this. I think it is practicable. I am inclined to believe that it is the only way to obtain a responsible person in each state to whom we can look for efficient organization.

We need the active and vigorous coöperation of the American Medical Association. We need the promptest and most thorough action in this regard. Will you not call together a sufficient number of your executive council to authorize this coöperation by the Association, and to consider a definite and concrete proposition which can be presented here, and upon which we can act?

Yours very truly,
(Signed) Hugh S. Johnson,
Lieutenant-Colonel, Judge Advocate, Executive Officer.

The Board of Trustees, on October 19, 1917, in special session assembled for the purpose of considering the matter, all the members being present, unanimously adopted the following resolutions:

Resolved, that the Board of Trustees, for and on behalf of the American Medical Association, accepts the invitation to coöperate with the Provost Marshal General in the matter presented in the letter of Lieut. Col. Hugh S. Johnson under date of October 13, 1917.

Resolved, that a committee of three be and hereby is appointed with full power to act in conjunction with the Provost Marshal-General in the premises.

The following committee was appointed: M. L. Harris, secretary, Board of Trustees; Hubert Work, speaker, House of Delegates, and E. J. McKnight, member of the Board of Trustees.

This officially offered the coöperation of the Association and its officers to the Provost Marshal-General in the proposed formation of these medical advisory boards. A report of the action taken by the board was submitted by the Speaker of the House of Delegates and the Secretary to the members of the House of Delegates of the American Medical Association. It was adopted unanimously by a postal vote, 116 affirmative votes having been cast. Moreover, the House of Delegates, by action taken at the 1918 annual session, ratified the postal vote adopting the report of the Board of Trustees and continued the committee with power to act for the Association in all matters pertaining to placing the Association at the service of the Government for the war.

War Committee's Activities.—The War Committee as soon as it was empowered, proceeded to Washington in company with the editor of the *Journal.* On its arrival there, it sought and obtained an interview with the Provost Marshal-General and his associates and formally tendered the services of the American Medical Association to that office for such service as the Association could render in the creation of medical advisory boards. The Provost Marshal-General asked the committee to submit a definite working proposition for the formation and supervision of these boards. This the committee did and the general plan was approved by the Provost Marshal-General and afterward adopted.

The committee then returned to Chicago and arranged a meeting with representatives of the Committee on States Activities, General Medical Board, Advisory Commission, Council of National Defense.

At this conference Drs. Edward Martin, Philadelphia, F. F. Simpson, Pittsburgh, and John D. McLean, Philadelphia, announced that they were in position to serve as a committee from this Committee on States Activities to coöperate with the committee of the American Medical Association and it was agreed that these three, together with three constituting the American Medical Association committee, should become a joint committee and that it should have authority to name a seventh member. Subsequently, this joint committee met in Washington, D. C., November 1, 1917, when the joint committee organized by electing Dr. Edward Martin, Philadelphia, chairman, adding the secretary of the American Medical Association to the committee and selecting him as its secretary.

The joint committee was advised that the Provost Marshal-General desired immediately to have suggested to him for each state the name of a member of, or of a physician who would accept a commission in the Medical Reserve Corps, in order that a request might be made to have these medical officers ordered to active duty as *medical aides to the governors of the states* in the assignment of medical advisory boards. The joint committee thereupon proceeded to select a physician in each state to be recommended for this duty. On November 16, 1917, the joint committee reconvened in Washington, when the members representing the American Medical Association were advised by Dr. McLean, Secretary of the Committee on States Activities, Medical Section, Council of National Defense, that it had been found necessary to substitute twenty-four names of men for a like number agreed on at the previous meeting of the joint committee to serve as medical aides to the governors. He further reported that the men who had finally been selected, including the substitutes, had been notified of their appointments and had been ordered to present themselves in Washington to be commissioned and instructed at a conference held on Saturday, November 18. The joint committee was then called into session by Dr. Franklin Martin and the following were added to the committee: Drs. Franklin Martin, *ex-officio;* Charles H. Mayo, President of the American Medical Association and Robert L. Dickinson, Brooklyn. Just before the adjournment of this last named committee, the chairman of the War Committee of the American Medical Association announced that while the Association stood ready to coöperate to further war interests it must state definitely that the work volunteered by the Association must be done through its own war committee.

After this meeting, held from November 16–18 (1917), inclusive, no advantage was taken of the Association's offer to coöperate with the Council of National Defense in the matter of establishing and standardizing the medical advisory boards, or in any other direction.

In January, 1918, the War Committee of the American Medical Association learned that the medical aides to the governors were being advised by the General Medical Board, Council of National Defense, that their work had been completed, and that their active duty would cease. An inquiry addressed to the office of the Provost Marshal-General brought a reply stating that under the Selective Service Regulations that office had, under the Secretary of War, sole and exclusive jurisdiction over the administration of the Selective Service Law and that proper steps had been taken to continue the services of medical aides to governors until such time as that office is satisfied that their services are no longer necessary.

At its meeting held on February 1, 1918, the Board of Trustees further empowered the War Committee to act in cooperation with the Provost Marshal-General's Office, the Surgeon-Generals of the Army and Navy, and such other military offices as may be deemed best in the interest and for the successful conduct of the war, and elected Dr. A. R. Mitchell of Lincoln, Neb., to succeed Dr. E. J. McKnight, deceased, as a member of the War Committee representing the Board of Trustees. It further added to the War Committee as ex officio members thereof, the President and Secretary of the American Medical Association, and the editor of the *Journal*. Later, Dr. Wendell C. Phillips, a member of the Board of Trustees was added to the War Committee and Dr. Frank Billings, Secretary of the Board, was substituted for Dr. M. L. Harris, who declined to stand for reelection when the time for which he was elected expired.

Under date of April 3, 1918, the Surgeon-General of the Army addressed the American Medical Association submitting a memorandum of a plan for the utilization of the organization and machinery of the Association, in addition to the activities of the other bodies, viz., the Medical Section of the Council of National Defense and the different sections and organizations of the American Medical Association, for the purpose of securing future increment to the Medical Reserve Corps and for keeping the numerical strength of the Corps up to the requirements of the service. This plan contemplated a close coöperation between the office of the Surgeon-General and the officials of the American Medical Association, through the officials of the different state and county medical societies and through the different section organizations of the American Medical Association. On receipt of this communication, the War Committee convened in Chicago, April 16, 1918, and by formal action undertook the task assigned to it by the Surgeon-General of the Army, and issued a statement announcing its action and declaring its confident anticipation of the hearty, active, patriotic coöperation of all physicians for the successful accomplishment of the task. Immediately, a call was issued for a conference of the secretaries of the constituent state associations which was held at the headquarters of the Association in Chicago on April 30, 1918.

At this conference, thirty-eight constituent state associations were represented by their secretaries or an accredited alternate. Dr. Thomas McDavitt, secretary of the Minnesota State Medical Association and chairman of the Board of Trustees, was elected chairman of the conference and the entire day was devoted to the discussion of how the organized medical profession could be utilized effectively for the winning of the war and, specifically, how the American Medical Association, its constituent state associations and their component county societies could assist in enrolling the required increments for the Medical Corps of the Army and Navy. On the adjournment of the conference, the secretaries of the state associations returned to the several states with the determination to coördinate the forces of the organized medical profession in their states with other agencies working with similar objects.

To determine to what extent the medical profession in various parts of the country had met its responsibility to the government the War Committee published in the *Journal* for June 1, 1918, a survey or Honor Roll of the medical profession of the United States. This survey presented under each state a table which showed important facts regarding each county in the state; the area, population, total number of physicians, number of women physicians, number of physicians members of the county society, and the number of physicians under commission in the Army and in the Navy. In addition to this table, there was published for each state, under the counties and postoffices the names of all those physicians of the state, who had accepted commissions in the Medical Reserve Corps of the Army and Navy or who were in active service in the Medical Department of the Federalized National Guard. The published list did not include the names of the members of the regular Medical Corps, those who had been commissioned in the Reserve Corps but who had not accepted their commissions, nor those who were serving as contract surgeons. This Honor Roll proved effective in stimulating applications of commissions in the Medical Reserve Corps.

Support of Medical Education.—By the time this country entered the world war the reforms among medical colleges had made such progress that for several years most of the medical graduates had benefited from improved conditions in medical schools, such as higher entrance requirements, more skilled teachers, better laboratories and laboratory equipment, better clinical material and greatly improved methods in medical teaching.

In this connection it is to be noted that it is graduates of later years, in largest proportions, who have entered the government medical services.

The Council on Medical Education of the American Medical Association, in addition to the information it had collected, rendered other important services to the government, which are briefly enumerated as follows:

(*a*) When the selective service law was enacted, it made no provision for the exemption of medical students. In the Medical Students' Register, the Council had the home addresses of the majority of students enrolled during 1916–1917, and was able by direct correspondence to secure reliable information showing the proportion of students who would be taken by the draft. The data collected had much to do with the provision made later, whereby drafted students were permitted to enter the enlisted reserve corps and to remain in medical colleges until they completed their medical training.

(*b*) Only such students were eligible for admission to the enlisted reserve corps as were enrolled in "well-recognized" medical colleges, which were defined as those recognized by the majority of state medical licensing boards. The only information immediately available by which it could be decided which colleges were so recognized, was that published by the Council on Medical Education of the American Medical Association in the State Board Statistics, based on reports signed by the various state board officers.

(*c*) The Council's files of information in regard to medical colleges were also placed at the disposal of the Surgeon-General, and the secretary of the Council has cooperated in inspecting and furnishing reports to the Surgeon-General regarding a number of medical schools.

(*d*) The Council's files of information in regard to standards of preliminary and medical education have likewise been utilized by the Surgeon-General. This information included, also, a list (compiled by the Council) of hospitals considered in position to furnish acceptable interneships.

Constituent State and Component County Branches.—In addition to the foregoing activities, which were conducted in the main from the headquarters of the Association, the component state medical associations and their constituent county medical societies beside the coöperation they accorded the American Medical Association, instituted and carried on many measures within their several jurisdictions. These branches of the American Medical Association, through their coöperation with various agencies, many of which were independent of the organization of the American Medical Association, contributed to the success of measures which were undertaken with the object of mobilizing the medical profession and of placing the organization and personnel of the profession at the service of the Government for the winning of the war.

NOTES ON VENEREAL DISEASE IN THE ARMY BASED ON THE STUDY OF 10,000 CASES[1]

By Captain THEODORE HALL
Sanitary Corps, United States Army

IN THE Military Surgeon for March, 1920, Col. Percy M. Ashburn, Medical Corps, U. S. Army, published a valuable analysis of the circumstances attendant upon the infection of 3,000 soldiers of the Army with venereal disease from early in September, 1919, to December 15, 1919. Since that publication similar records have been completed on 10,000 cases of venereal disease in the Army, commencing September 10, 1919, and ending September 13, 1920, a period of 370 days. The information is compiled from separate reports made on each case of venereal disease detected by the medical authorities, each report containing the initials, organization and length of service of the soldier, the diagnosis of the disease by the medical officer, and the voluntary and confidential statements made by the soldier in response to prescribed questions. Current reports on each group of one thousand cases have been made from time to time and published to the service. These reports, 9 in number, the first having included 2,000 cases, are combined and classified in Table I on the following page.

Items 1, 2 and 3. The length of time in which each group of 1,000 cases has accumulated and been reported to the Surgeon General is fairly uniform throughout the year. Slight divergences are probably due to variations and delay in the time of forwarding reports, rather than to other causes. The varying strength of the personnel of the Army would have its influence, but the figures remain close to the average of 37 days for each 1,000 cases.

Item 4. The average length of service was 25.94 months. Slight reductions from the average in the last three reports are probably due to increasing enlistments during that period.

Items 5, 6 and 7. Gonorrhea constituted 65.83 per cent, chancroid 21.15 per cent, and syphilis 13.02 per cent of the total number of infections. Throughout the year the percentages of gonorrhea in the various reports were fairly constant, those of chancroid evidenced an inclination to rise, while those of syphilis have shown a marked decrease from 20 per cent in the first report to 10 per cent in the last, which was somewhat below the average of 13.02 per cent for the entire year.

Items 8, 9 and 10. There has been an increasing percentage of cases contracted near the place of service. The percentage of cases con-

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Table I.—*Analysis of the Nine Consolidated Reports of Individual Venereal Disease Reports, Numbers* 1,000 *to* 10,000, *Submitted in Compliance with S. G. O. Circular Letter No.* 293, *Between September* 10, 1919, *and September* 13, 1920.

		1st report	2d report	3d report	4th report	5th report	6th report	7th report	8th report	9th report	All reports	
1	Date or period covered	Sept. 10 to Nov. 10, 1919.	Nov. 11 to Dec. 15, 1919.	Dec. 16 to Jan. 20, 1920.	Jan. 21 to Feb. 26, 1920.	Feb. 27 to April 7, 1920.	April 8 to May 17, 1920.	May 18 to June 23, 1920.	June 24 to Aug. 7, 1920.	Aug. 8 to Sept. 13, 1920.	Sept. 10, 1919 to Sept. 13, 1920.	1
2	Length of period covered, days	62	35	36	37	41	40	37	45	37	370	2
3	Number of individual cases reported in the period	2,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	10,000	3
4	Average length of service, months	27	28.15	26.75	27	24.7	27.7	25	24	20.5	25.94	4
5	Percentage of cases of gonorrhea	66	64.5	66.8	63.5	64.7	67.2	65.3	66	67.3	65.83	5
6	Percentage of cases of chancroid	14	19.2	20	25.3	23.2	22.4	26.5	23.5	22.7	21.15	6
7	Percentage of cases of syphilis	20	16.3	13.2	11.2	12.1	10.4	8.2	10.5	10	13.02	7
8	Percentage of cases of disease contracted near station of soldier	45.7	48	52.8	69.1	76.3	70.6	68.5	73.0	65.3	61.70	8
9	Percentage of cases contracted at a distance from station of soldier	54.3	27.4	30.6	21.9	16.3	18.3	12	18.8	30.6	28.19	9
10	Percentage of cases contracted outside of United States and Possessions	....	24.6	16.6	9	7.4	11.1	19.5	8.2	4.1	10.11	10
11	Percentage of cases of disease contracted in a house of prostitution	23.18	21.6	28.46	29.11	33.6	38.2	43.4	37.1	36.3	31.51	11
12	Average time elapsing between the date of the infecting intercourse and the date of the detection of the disease by the military authorities, days	17	16.9	17.7	18.17	18.5	23.1	15.7	15.8	10.9	17.18	12
13	Percentage of cases of disease in which the use of alcoholic liquor was admitted by the soldier prior to, or at the time of the infecting intercourse	15	17.5	16.87	14.43	13.4	14.6	20.5	17.3	17	16.20	13
14	Percentage of cases of disease in which the soldier was solicited by the woman	34.68	32.8	30	27.5	29.4	29.8	28.9	32	29.2	30.90	14
15	Percentage of soldiers infected who took prophylaxis after exposure	53	52.7	45.66	43.71	42	47.6	53	47	42	46.90	15
16	Average time from first exposure to use of prophylaxis; hours, minutes	2h.30m.	2h. 15m.	2h. 15m.	1h. 53m.	2h. 15m.	2h. 6m.	1h. 56m.	1h. 57m.	1h. 59m.	2h. 10m.	16
17	Number of men who admitted staying all night with the woman	351	161	188	153	186	152	134	109	120	1,554	17
18	Percentage of soldiers who paid nothing for the infecting intercourse	47	42.9	42.1	39	38.6	37.2	29.1	33.5	33.8	39.09	18
19	Average price of intercourse when payment was made	$3.22	$3.20	$3.14	$2.88	$3.02	$3.17	$2.93	$2.94	$3.20	$3.10	19
20	Percentage of soldiers infected who admitted prior instruction by the military authorities as to the danger of contracting venereal disease	85.9	89.3	86.85	89.3	88.4	91.3	93.4	91.8	85.5	88.82	20
21	Average number of exposures during year for the men who answered question	15.5	13.7	15.13	13.9	13.3	15.1	16.8	14	21	15.32	21
22	Average number of exposures without prophylaxis for each case of disease following neglect of prophylaxis	10.4	11.3	12.7	11.1	11.7	11.5	13.3	11.7	16	12.13	22
23	Average number of exposures followed by Prophylaxis for each case of disease following the use of prophylaxis	14.2	14.2	17.6	16.5	15.6	19.3	20	16.1	19	16.46	23
24	Percentage of cases in which efforts were made by the Army authorities to remove the source of infection	15.2	6	8.5	10.9	19.2	14.4	15.3	12.6	10.3	12.76	24

tracted at a distance from the place of service had been falling through the year until an increase appeared in the last two reports. This is doubtless due to the number of recruits who were infected before enlistment or while on their way to permanent stations. With the withdrawal of troops from F ance, Germany and Siberia the percentage of foreign infections has materially decreased, and is now practically confined to troops in China, since these reports do not cover troops now stationed in Germany.

Item 11. Up to the eighth report there had been a very steady increase in the percentage of cases contracted in houses of prostitution, which would seem to indicate that such places were becoming accessible to soldiers in increasing numbers. The last two reports may indicate that a level has been reached.

Item 12. The average time elapsing between the date of the infecting intercourse and the detection of the disease by the military authorities is 17.18 days, a figure closely related to, and indicative of the efficiency of the regular bi-monthly inspection for venereal disease. The variation to 10.9 days in the last report is due to the exclusion from the computation of those individual reports stating periods of time that were approximate or uncertain, and is probably closer to the actual facts than the preceding figures.

Item 13. Drink has been a factor in 16.2 per cent of the cases. This is not to be taken as a true reflection of prohibition conditions within the United States, since a large proportion of the infections in which the use of alcohol was admitted by the soldier was acquired in foreign places, in the Philippines and in the Canal Zone. The percentage of infections following use of intoxicants within the United States is probably not above 10.

Item 14. The percentage of cases in which the soldier was solicited by the woman has very steadily decreased through the first eight thousand cases, and shows but a slight increase in the last two thousand. This may indicate that street conditions in the cities of the country where the bulk of such solicitation occurs have been improving during the year.

Items 15 and 16. 46.9 per cent of the infections occurred in spite of prophylaxis. The average period of time intervening between exposure and prophylactic treatment grew slightly shorter during the year, perhaps indicating a more prompt resort to such measures of early treatment by the soldier. The differences, however, are so slight as to be almost negligible.

Item 17. The number of men who stayed all night with women is about one-sixth of the number infected.

Item 18. The first 8,000 cases showed a steadily decreasing percentage of those who paid nothing for the infecting intercourse; the last 2,000 a slight increase in the percentage, but still considerably below the average percentage for the entire year. It is evident from these figures that the illicit intercourse of the soldier is returning to the commercial basis that prevailed before the war, and that there is less of the so-called "charity" type. It also seems to indicate that the young woman who during the war entertained the soldier gratuitously because of the lure of the uniform and other war-time excitements has now become a professional prostitute, or has ceased to dispense such favors.

Item 19. The average price paid for the infecting intercourse where payment was made at all has shown little variation throughout the year from the yearly average of $3.10.

Item 20. The percentage of soldiers who admitted prior instruction by the military authorities as to the danger of contracting venereal disease remains high in all reports. The slight reduction in the last two reports is undoubtedly due to the influx of recruits who became infected before they were instructed. The figures indicate that Section II, General Order No. 135, War Department, 1919 (Sex Morality), which provides for such instruction, has been closely followed by commanding officers.

Items 21, 22 and 23. The average number of exposures during the year for the men who answered this question was about 15 for each man. These figures, as well as those immediately following regarding the number of exposures without and with prophylaxis, are the vague and rough estimate of the soldier who almost as frequently in response to the questions admitted that he did not know.

Item 24. It is evident that the efforts of the part of the military authorities to remove the source of the infection by stimulating and assisting the civil authorities to apprehend, detain and medically treat the infected woman are far from adequate.

The study of the places of infection of the 10,000 cases discloses that the cities of the country produce venereal disease in varying amounts, mainly in proportion to their propinquity to large masses of soldiers, but also probably to some degree according to the moral tone of the city itself. It will be of interest to note that of the 10,000 infections the following places were responsible for the number set opposite their names:

Atlanta, Ga	326	Chattanooga, Tenn	99
Baltimore, Md	236	Chicago, Ill	86
Brooklyn, N. Y	15	Cincinnati, Ohio	48

Cleveland, Ohio	15	Newport News, Va	100
Columbus, Ga	196	New York, N. Y	161
Columbus, Ohio	58	Petersburg, Va	53
Des Moines, Iowa	88	Philadelphia, Pa	64
Detroit, Mich	22	St. Louis, Mo	179
El Paso, Tex	207	San Antonio, Tex	456
Kansas City, Mo	80	San Francisco, Calif	138
Little Rock, Ark	136	Seattle, Wash	20
Louisville, Ky	219	Tacoma, Wash	53
New Orleans, La	57	Washington, D. C	70

However, for the reasons already stated, viz., the proximity of military stations to certain cities, it must be understood that these figures do not represent a true index of the relative vice conditions in these communities.

* * *

THE PROBLEM OF ADMINISTERING VENEREAL PROPHYLAXIS IN CITIES ADJACENT TO ARMY CAMPS

By Major CARL W. SHAFFER

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(With six illustrations)

IT IS generally agreed that the number of venereal cases in the Army has been greatly reduced by the prompt use of the prescribed prophylactic treatment. The results of prophylaxis are greatly influenced by three factors, viz.:

1. Length of time between the hour of exposure and the hour of treatment.
2. Location of the prophylactic stations.
3. Methods and carefulness of the administration of the treatment.

During the latter months of 1919 particular attention was paid to the establishment of prophylactic stations at each infirmary in Camp Travis, and orders were issued to insure that each man was informed of the location of the stations. In addition, green lights were kept burning all night to indicate the location of the various infirmaries.

It was found, however, that the great majority of the men developing venereal diseases failed to take the prescribed prophylaxis and efforts were made to discover the reason for such failure.

Camp Travis is located about 4 miles from the center of San Antonio. Jitneys operate between the city and the camp and street cars run as far as Fort Sam Houston (about 1 mile from Camp Travis). The starting points of the jitneys and street cars are within a block of the city post office. It was found that rather than spend an hour in making the round trip to the camp for prophylactic treatment and thereby spoil their evening the men were inclined to "take a chance" without the prophylaxis. A prophylactic station was being operated in San Antonio, but it was located near the restricted district and was somewhat out of the way for Camp Travis men, being on the opposite side of the main part of the city.

The soldiers follow the crowds, and as practically all of the theaters, dance halls, drug stores and other stores open at night are located on Houston Street and Alamo Plaza, it was decided to establish a prophylactic station near these streets and also near the jitney and street car starting points.

No funds were available for renting a room, but the division recruiting officer had secured a location on a vacant lot just opposite the post office at the corner of Houston Street and Alamo Plaza and a transportable house was placed there as a recruiting office. As there was more room than was needed for this purpose, permission was obtained to use approximately one-third of the building as a prophylactic station. (This house was moved shortly afterwards to a vacant lot two blocks from the post office and one-half block from Houston Street.) (See Fig. A.)

The prophylactic station was separated from the recruiting station by the use of Beaver board and the station itself was divided into two rooms by the use of the same material—a waiting room and a treatment room, each room having two windows. The lower sashes of the windows were painted white, while strips of gauze were placed over the upper sashes, allowing a free circulation of air, but not permitting a view from outside. Two benches were placed in the waiting room. The walls of the rooms were painted white. The station was equipped as all other stations in Camp Travis, as follows:

Supply of venereal prophylactic cards, Form 77, M. D.
Writing table.
Ink and pens.
Blotting paper.
Three basins, white enamel.
One bottle green soap, with glass tubes in cork.
Oil stove for heating water and boiling syringes.
One Pyrene fire extinguisher.
Supply of kerosene.
Five-gallon bottle for bichloride of mercury solution, 1–1,000, on shelf above patient's head and arrangement by syphoning for solution to flow over genitalia.
Supply of bichloride of mercury tablets (to be kept in closet).
Absorbent cotton.
Towels, hand.
G. I. buckets for wastes.
Twelve syringes, glass, with rubber bulb.
Two wide-mouth covered jars in which to keep sterile syringes and used syringes.
Medicine glass into which solution of protargol is poured when giving injection.
Supply of calomel ointment, 30 per cent, in waxed papers.
Toilet paper.
Nailbrush.
Notebook.
Protargol, powder, in 2-gram papers, kept in amber-colored jar.
Solution of protargol, 2 per cent.
One clock.
Appropriate signs.

(See Figs. B and C.)

The great handicap in this station was the lack of running water and sewer connection. This was overcome by the use of the following equipment: Two 10-gallon enameled coffee boilers, with faucets, one for hot water and the other for cold water. One boiler was kept on the stove at all times, a small stand being made for the other. The treatment box, as shown in photograph, is described as follows: A small box made of ⅞ by 8 inch lumber, 16 inches square by 2 feet 3 inches high, covered with No. 26 gauge galvanized iron, in the shape of a frustrum of a square pyramid turned upside down; base of the pyramid 20 inches square, 5 inches high; top 5 inches square and split at corners; edges curled over sides of box. There is a funnel 2 inches in diameter extending down 8 inches, covered at opening with one-fourth inch wire mesh. All seams soldered. There is a door 13 by 17 inches in front, with two spring hinges and door handle. It is floored with lumber and this is covered with No. 26 gauge galvanized iron and designed to hold a common galvanized iron bucket. (See Figs. D and E.)

An electric light was placed just above the treatment box. Just above the light was a shelf upon which was placed a 5-gallon bottle with siphon attachment, containing 1–1,000 solution of bichloride of mercury. Clean towels were also stored on this shelf. (See Fig. F.)

The treatment box was placed in a small stall lined on the three sides with galvanized iron which could be easily cleaned. A white enameled bucket was kept by the side of the box to receive cotton and other wastes. The waste was burned twice daily. In addition to the articles listed above, an electric fan and the attendant's cot were placed in the treatment room. A sign was posted on the wall of the waiting room: "Awaken attendant for prophylaxis."

As the recruiting officer complained of the green light, stating that it might have an untoward effect upon recruiting, the light was discontinued and a sign, "Physical Examination Room," was placed on the outer door and all men were notified in orders of the change.

Efforts have been made to secure the most reliable and trustworthy men as attendants for this station. Three men are on duty and the tour of duty is arranged so that each man is on duty every third night, the tours of duty being arranged as follows: 6.30 a.m. to 12.45 p.m.; 12.45 p.m. to 6.30 p.m.; 6.30 p.m. to 6.30 a.m. So that each man comes on duty every day and the station is open at all hours.

The following instructions outline the duties of each attendant, so that there will be no confusion in the police and cleanliness of the station:

Attendant on duty from 6.30 *a.m. to* 12.45 *p.m.:*

1. General police of the station.
2. Sweep floors and remove dust.
3. Wash and mop floors on Tuesday, Thursday, and Saturday.
4. Empty all waste water and burn trash.
5. Clean all buckets thoroughly.
6. Scour pans and galvanized iron on treatment box.
7. Fill tank of stove with kerosene.

8. Inspect supplies. Make note of all supplies needed and send list to sanitary inspector by motorcycle driver. At least 75 papers of calomel ointment and 5 papers of protargol must be on hand at all times. If kerosene is needed, return can by motorcycle driver.
9. Soiled towels to be sent to laundry twice a week.

Attendant on duty from 12.30 *p.m. to* 6.30 *p.m.:*

1. Prepare solution of protargol every other day. Mark date of preparation on label.
2. Prepare liquid soap when necessary.
3. General police.

Attendant on duty from 6.30 *p.m. to* 6.30 *a.m.:*

1. See that all containers for water are filled.
2. Place all prophylactic cards in envelope and send to sanitary inspector.
3. Arrange all bed clothing in order.

The prophylactic station must be kept neat and clean and ready for inspection at all times.

The following procedure is rigidly followed in administering the prophylaxis:

1. Take name, serial number and organization of soldier. Verify name, organization, etc., by the identification tags. Require the man to expose external genitalia thoroughly by raising shirts and allowing breeches and drawers to fall to knees.

2. The attendant will then examine the patient for discharge from the urethra and sores on the penis. If either of these conditions are discovered a note recording the observation will be made on the prophylaxis card, otherwise the treatment will be administered as prescribed. This note on the prophylaxis card will be reported promptly to the organization surgeon.

3. The man will urinate and proceed as follows: Wash genitalia thoroughly with about one tablespoonful of green soap and warm water.

4. Wash the genitalia thoroughly with bichloride of mercury solution (1–1,000) by allowing the solution to flow over the penis, with foreskin retracted, the hair and surrounding parts.

5. The attendant must inject one teaspoonful of 2 per cent solution of protargol or silver proteinate into the urethra. As the syringe is withdrawn the patient is to close the opening of the urethra (meatus) with the thumb and forefinger and retain the solution *five minutes* by the clock.

6. Dry the parts with a towel. If towel becomes stained with the silver salt, wash it out with cold water before it becomes dry.

7. The patient will then be furnished with a measured amount of calomel ointment, in waxed paper, which is to be smeared over the surface of the penis while the foreskin is retracted. The patient will carefully and thoroughly rub the ointment into all parts of the skin covering the penis, being very careful to withdraw the foreskin and to rub thoroughly about the meatus, head and neck of the penis. This rubbing should be continued until the ointment has disappeared, leaving only a greasy film on the surface of the penis. Any excess of ointment remaining will be rubbed toward the base of the penis and the scrotum.

8. After the inunction is completed and only a greasy surface remains, the foreskin will be drawn over the head of the penis to protect the ointment against being rubbed off.

9. The attendant will then see that the waxed paper which contained the ointment is used to wrap around the penis to prevent the ointment being rubbed off and to protect the clothing.

10. The patient will be directed not to urinate within a period of four or five hours after the treatment.

11. Soap, nail brush, water and towels will be provided by the attendant to permit the patient to wash his hands, by which operation the treatment is completed.

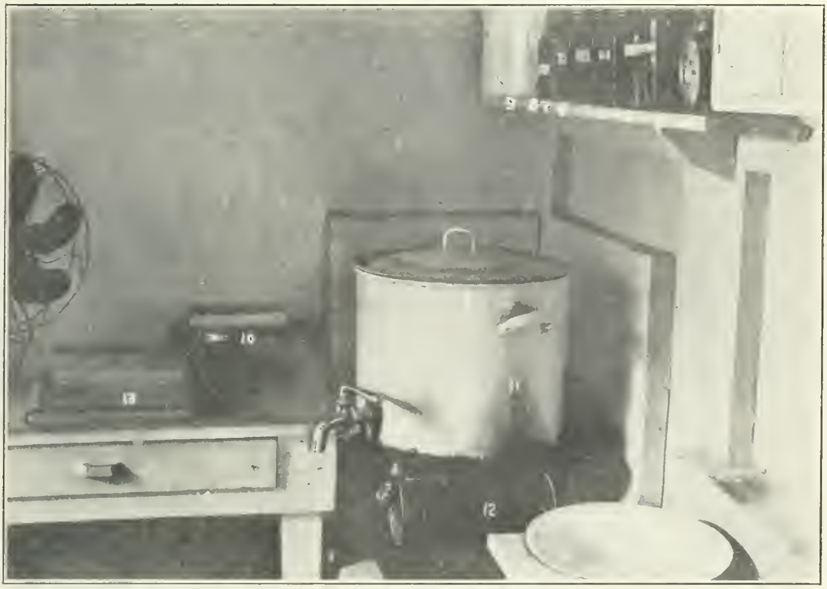
12. Make the proper notations on the prophylaxis card and file.

13. If more than three hours have elapsed between the hour of exposure and the hour of treatment, direct the patient to report once daily for the next three days to his infirmary to receive an injection of 1 per cent solution of protargol or silver proteinate to prevent the development of gonorrhea.

It was found that on account of a lack of uniformity in the weight of the various protargol preparations of different manufacturers it was not possible to obtain an accurate 2 per cent solution of protargol except by weight. As the various infirmaries were not equipped with scales it was decided to have two gram packages of protargol weighed at a central place, put up in waxed paper and then sent out to the various prophylactic stations. Due to the fact that there is a great deal of waste in scooping out the calomel ointment with a spatula and as it is hard to keep clean when it is constantly exposed, small packages of the ointment were put up in waxed paper and sent along with the protargol papers. The papers contained approximately one drachm of calomel ointment. This method has proven very satisfactory, prevents waste and insures uniformity.

As the temperature is high in the summer in Texas and as there is only 5 per cent of white wax in calomel ointment, it is necessary to keep

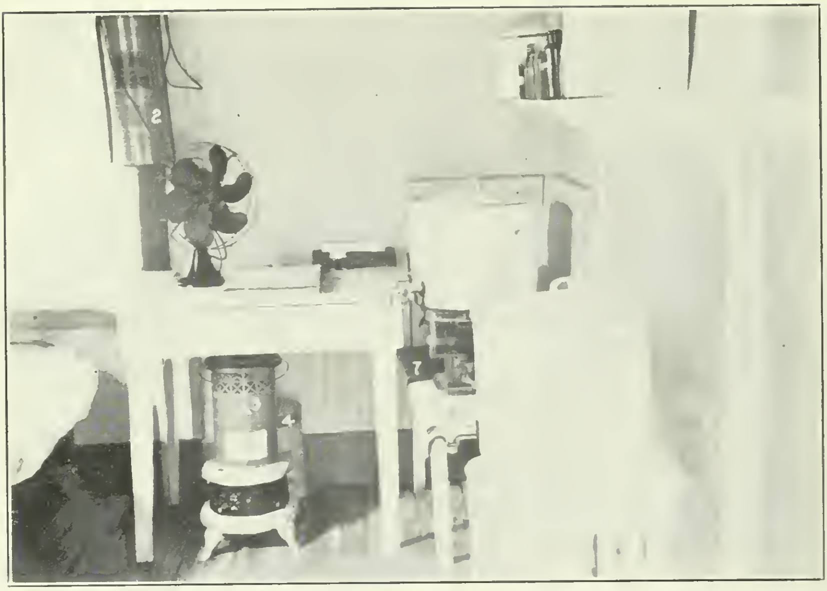
Cut A.—Exterior of Prophylactic Station.



Cut B.—View of Treatment Room.

1. Clock.
2. Liquid soap
3. 2 per cent protargol solution.
4. Jar containing sterile syringes.
5. Jar containing papers of calomel ointment.
6. Jar containing used syringes.
7. Jar containing papers of protargol.
8. Graduate and medicine glass.
9. Jar containing cotton pledgets.
10. Prophylactic cards, Form 77, M. D.
11. Boiler containing hot water (on oil stove).
12. Oil stove.
13. Book containing record of prophylactic treatments.
14. Writing table.
15. Basin, on stand, for washing hands after treatment.

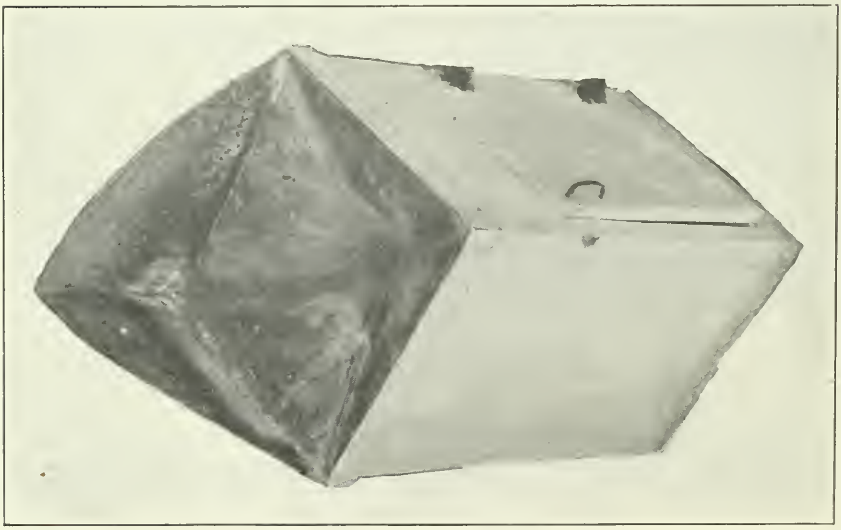
(To face page 578.)



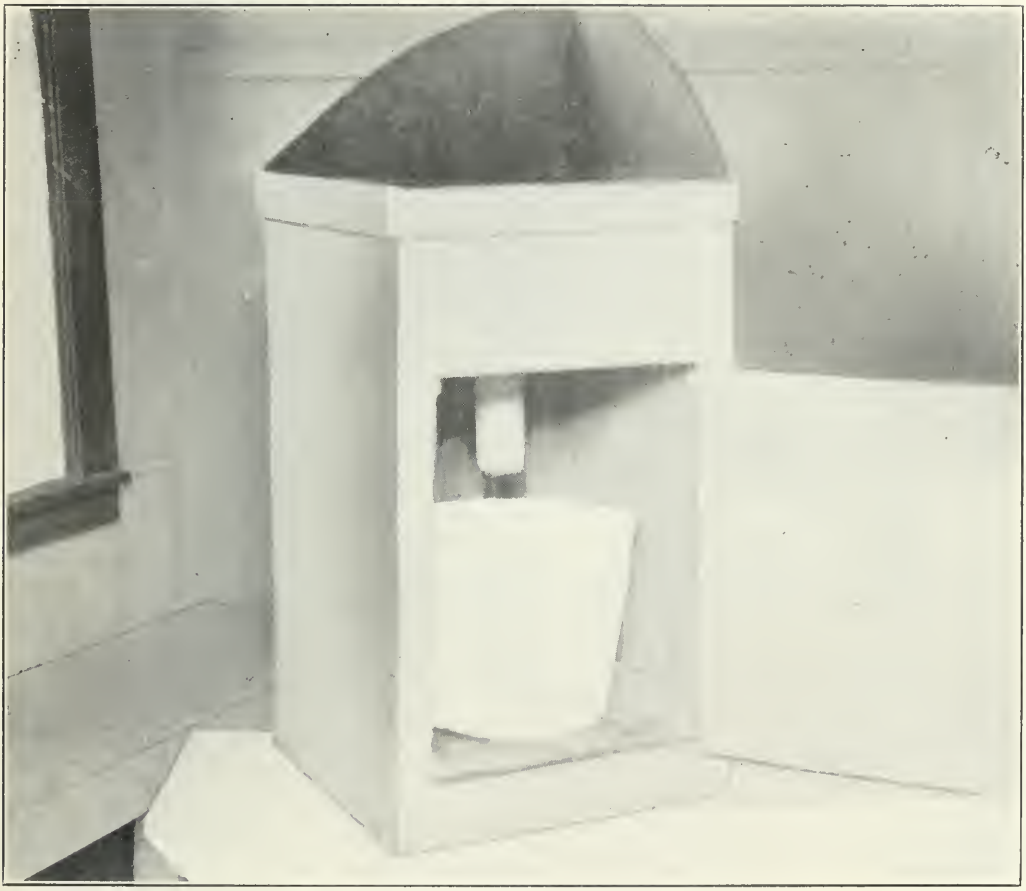
Cut C.—View of Treatment Room.

1. Wall cabinet containing bichloride of mercury tablets, etc.
2. Fire extinguisher.
3. Oil stove (heater).
4. Supply of kerosene.
5. Boiler containing hot water
6. Boiler containing cold water.
7. Stand (covered with galvanized iron for oil stove).

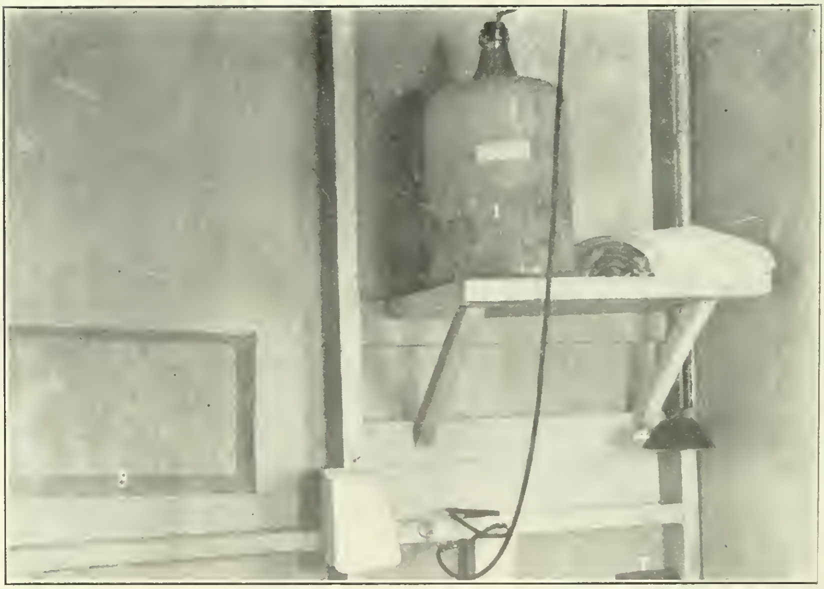
Attendant's cot at left..



Cut D.—Treatment Box, Closed.



Cut E.—Treatment Box, Open. Note funnel and bucket.



Cut F.—Shelf Above Treatment Box.

1. Five gallon bottle containing 1-1000 solution of bichloride of mercury.
2. Siphon attachment.
3. Clean towels.
4. Electric light.
5. Stop-cock over rubber tubing.
6. Toilet paper.
7. Nail brush.
8. Map showing restricted district.

the ointment on ice to prevent melting. This is done by having a small galvanized iron container which fits in the water cooler over the ice.

The following statistics prove the efficacy of prompt treatment as shown by the reports of this one station:

From January 12, 1920 (when the station was opened), to July 1, 1920, less five days when the station was moved, 1,361 prophylactic treatments were given. Of this number, 572 were given to Camp Travis men and of the 572 there were only three failures. The cause of the failures is not known, but it is thought that the length of time elapsing between the hour of exposure and the time of treatment plays an important rôle.

As many as 63 treatments have been given in this station in a single night (between the hours of 6.30 p.m. to 6.30 a.m.). If the patient states that there has been an interval of three hours or more between the time of exposure and the time of treatment, he is instructed to report to his infirmary each day for three successive days for treatment.

Summary:

Men will take prophylaxis if the station is located at a convenient place. There should be at least one prophylactic station near the main streets of the city.

Privacy must be insured.

Lack of water and sewer facilities should not interfere with the establishment of the stations.

The prophylactic station should be kept very clean and arranged so that it resembles a treatment room in a hospital.

Attendants should be carefully selected and must be trustworthy men.

If taken promptly the prescribed prophylaxis is a very valuable procedure in preventing venereal diseases.

ADVANTAGES OF BENZOATE OF MERCURY IN THE SYPHILITIC PROBLEM

By Captain HOWELL B. GWIN
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WE MUST frankly admit that the therapy of syphilis is in a rather unsettled state at the present time. Hopes have been shattered and dreams have failed to come true. We cannot help deploring the circumstances which for a time revolutionize medical thought, and, alas, leave behind them a degree of skepticism and uncertainty requiring years to overcome. Yet this is a feature of progress, and without progress our profession would represent only a barren plain outlined by whitened sepulchers.

For 400 years mercury was recognized as the only remedy having a specific influence upon syphilis. But suddenly we find that old things have passed away. From across the sea there bursts upon the therapeutical firmament a meteor of dazzling brilliancy and the profession bows down with one accord to chant the *Te Deum "Gloria ad Therapia Sterilizans Magna!"*

But time is the adjudicator of all things, and medicine furnishes no exception to this rule. However loudly a remedy may be proclaimed by its sponsors, it is bound to find its proper place in due time, and the more insistent the demand for recognition, the sooner it will be adjudged by the profession.

No remedy illustrates this fact better than salvarzan, which in a few brief years has run a most spectacular career and settled down to a very limited but fruitful field of usefulness.

Undoubtedly there is a strong tendency to return to our old time remedies. It seems but fitting for us to consider at this time how we shall administer mercury so as to obtain the best results. One feels a hesitancy in asking such an elementary question. Yet he will be astounded, almost as soon as he begins to investigate, to find what a diversity of opinion exists upon the subject among our most eminent syphilographers.

Two years as regimental surgeon of the 3d United States Infantry and as chief of the venereal service in United States Army Base Hospital No. 4, besides twenty years spent in the study and practice of genitourinary diseases, gives me a modicum of experience and entitles me to speak with some degree of authority upon this subject, now engaging the attention of the world as never before—and just here let me say that the *experiences* of men are of more value than their *theories*.

Upon the utility of the remedy the profession may be said to be of one mind. The unbounded faith of men such as Schaudinn, Metchnikoff, Neisser and Wassermann is reflected in the minds of physicians in every department of practice and finds its expression in the application of mercury in one form or another in a very large percentage of cases treated throughout the civilized world.

This fact only intensifies our obligation to consider carefully the best manner in which to administer mercury.

We are informed by as eminent an authority as Fournier that "oral administration of mercury is the true method." In this country White and Keyes are earnest advocates of the same idea. Jonathan Hutchinson considers his gray powder with opium as superior to all other forms of the drug. Upon the heels of these opinions comes Hay's rather pessimistic expression: "Internal administration of mercury is feeble and slow to act upon syphilitic manifestations and disappointing to the patient." The physicians of Hot Springs, Ark., (which place may be regarded as a veritable dumping ground for uncured and badly treated cases of syphilis), are almost a unit in their esteem of the inunction method; special facilities for the application of hydrotherapy having much to do, no doubt, in causing them to select this form of application.

Considering briefly the objections of the several methods of administration, we may remark that the uncertainty of results depends largely upon the faulty assimilation and absorption of the drug. It is most difficult to determine what a normal dose of mercury is in a given patient without taking chances of deranging the digestive tract. Especially when this is accomplished by ptyalism the condition is not pleasant. Again, we must not overlook those cases where we find mercury accumulating in the liver, to be thrown in the general circulation abruptly and with disastrous results.

The inunction method presents so many objectionable features that we may regard it as being adapted to sanitarium treatment only. Aside from the enforced discomfort and the publicity which this method entails, we must consider the extreme lack of impressionability of certain skins which renders the treatment useless.

The some-time popular vapor bath has vanished into thin air, leaving no trace of therapeutic justification for even a transitory popularity.

We will now consider what I regard as a most desirable method for the introduction of mercury by injection.

What are the advantages of administration of mercury by injection in syphilitic cases?

First, we are able to control our patients better. The necessity of coming to the physician's office regularly—the moral effect of methodical and skillful administration of the remedy at stated intervals and the opportunities thus offered for timely admonitions, all count in the patient's favor. The medical attendant is thus enabled to observe the progress of the treatment from day to day. How easy and common it is to hand out a bottle of pills to a patient and dismiss him with the suggestion: Come back and see me when these are finished. Nothing short of most untoward conditions is apt to bring such a patient back to the physician earlier, and if luckily he is faithful in taking his medicine and seems to improve he is likely to grant himself a furlough for good deportment and thus interrupt the treatment.

It is useless to dwell upon the effects of mercurials upon the digestive tract. The widely varying dosage required to produce a given result in different cases shows how much the secretions of the stomach and bowels, as well as other influences, enter into this perplexing problem. The cumulative effects, their train of unpleasant and lingering manifestations, ptyalism, stomatitis, etc., are unpleasant reminders of tardy progress.

In striking contrast with all this stands out the administration of the mercurial injection. Clearly, accurately and with the assurance of specific results without digestive or other disturbances our work may be accomplished. We here have a minimum dosage—absolute control of the drug; we can detect the earliest evidence of hypermedication and, best of all, shorten the time of treatment in every case. Surely, these are all points worthy of serious consideration.

But there are drawbacks to the injection method, and we must consider these too.

First of all is the question of pain caused by the mercurial. This is a factor that we cannot ignore. Such pain varies in duration from a few hours to several days, and may be sufficiently severe to entirely dishearten the patient and cause him to abandon the treatment. Too many physicians belittle this objection, believing that these patients exaggerate their statements. A single injection into their own muscles would promptly change their minds. Large indurated and painful nodules often stand out as sad reminders of where the patient was "shot." Aside from their discomfort, these are proof positive of faulty absorption. They may indicate that the injection was not properly given. I will refer to this later.

We have enumerated the leading factors, favorable and unfavorable, to the injection method. Let us now consider the form of mercurial to be used in our injection. Of these, from an active therapeutic standpoint, calomel is probably the most popular. It is likewise the most painful. The bichloride and gray oil are close seconds from the standpoint of pain inflicted and therapeutic activity. The succimide of mercury has enjoyed a popularity which I have found it impossible to justify. Of the various preparations of mercury used hypodermically I have found it less active than those enumerated above and certainly as likely to produce very painful and hard nodules at the site of injection. The salicylate of mercury is reliable, although not devoid of the objectionable features which characterize those already enumerated.

Some years ago, while in the St. Louis Hospital, Paris, in the service of Professor Gaucher, I became much impressed by the effects obtained through the use of a preparation having for its active principle the benzoate of mercury. This was prepared from freshly made mercury benzoate, dissolved in sterile water, so as to form a 1 per cent solution, with an addition of 2.5 per cent of sodium chloride. The remedy was referred to in a recent number of *L'Union Pharmaceutique* by M. Desmoulieres and M. Lafay. While I observed brilliant results following its use, there was still the drawback of pain after injection, likewise some induration. As to the therapeutic activity, I have never found any other mercurial to compare with the benzoate.

Having in mind the elimination of all objectionable features, I succeeded in elaborating a vehicle having for its base an aqueous extract made from the contents of the thoracic duct of the healthy bullock. After this had been prepared I added the chemically pure benzoate of mercury. This is another important point. Ordinarily, commercial benzoate of mercury is crude and irritating—totally unfit for the purpose. As intimated above, it should be recently prepared.

I give here the exact method of preparing this solution:

The healthy bullock having been slaughtered, the contents of the lymph reservoirs (the thoracic duct being the most capacious) are collected under strict antiseptic precautions. This lymph is rich in active, vigorous lymphocytes. An expressed extract is then made from the lymphatic glands, which is then fixed under high pressure. The filtrate is then added to the lymph which has been already obtained. This combined product, representing all of the dynamic constituents of the lymphatic system, is then subjected to the D'Arsonval process, after which benzoate of mercury sufficient to represent one-one hundredth grain to the minim is added. If the benzoate is pure, there will be no precipitate thrown down. The preparation is colorless and will keep indefinitely, but should be protected from the light by being kept in amber bottles.

This forms a beautiful, transparent preparation, absolutely *non-irritating*, and, when ordinary precautions are exercised, *causes little or no pain*. Most important of all, it insures perfect absorption of the drug in all cases. I believe this property cannot be claimed for any other preparation of mercury. I have been astonished at the prompt constitutional effects displayed by a minimum dose (5 minims, representing one-twentieth grain of the benzoate).

It has been my custom to administer the remedy in 10-minim doses (one-tenth grain mercury) daily. Frequently, especially in tertiary manifestations, I find it necessary to continue the treatment for three months. A slight disturbance of the gums warns one to reduce the dose and stimulate the secretions. Where the case is seen during the first or second stage of the disease I seldom find it necessary to continue treatment longer than sixty days. I have treated a sufficient number of cases in this manner during the past dozen years to satisfy my own mind as to the merits of the method.

I cannot refrain from dwelling upon the subject of care in the technic incident to the administration of the injections. I have spoken of these as being hypodermic. That is exactly what I mean. I find no advantage in injecting into the muscle. Much pain and soreness are thus avoided. Injecting into the loose interstitial tissues underneath the skin, we find abundant surface for absorption of the solution without mutilation of the deeper and more sensitive structures. Again, these injections may be administered in the subscapular region upon both sides of the spine, alternating from day to day, scattering them sufficiently, so as to cause no discomfort from their proximity. The consistency of the fluid admits of a very small needle (26 gauge); this again minimizes the pain inflicted. Of course, too much care cannot be exercised as to cleanliness. I find no necessity for sealing up the wound, for with a small needle puncture and thorough, deliberate massage at the site of injection, no fluid will escape.

At the risk of seeming unduly insistent upon this subject, I am impelled to urge care, not only in selecting the best form of mercurial for injection, but in exercising every precaution pertaining to the technic of administration. Much has been written at random by those of limited experience commendatory of the injection method. The uninitiated begins his work with keen anticipation of success and is chagrined when he finds that his patient cries out against a treatment which is painful and causes more distress than the malady for which he is being treated. Hope gives way to despair, and the physician is glad to return to the old method of treatment—if his patient has not already become disgruntled and gone elsewhere. This sort of experience is not pleasant to the practitioner, nor is it calculated to benefit him materially.

When I read the almost flippant articles lauding the injection method, and at the same time realize that these were inspired by a very limited experience and fertile imagination, I tremble for the conscientious physician who believes such statements to be actual verities and carries his patient with him up to the mountain of exaltation only to have his hopes dashed to the ground.

To minimize the results of my experience with the injection method, in which I used the mercury benzoate compound described above, I may say that I can give my syphilitic patient the following assurances:

To minimize the period of treatment. I seldom find it necessary to continue this longer than three months.

To spare the digestive tract and disturbance incident to medication.

To forestall a recurrence of the disease, if reasonable precautionary measures are followed up and correct habits observed.

Brief histories of a few of my cases will serve to illustrate results obtained:

Case I.—Male. Single. Age 29. Man of intelligence and exemplary habits. The patient was unfortunate in contracting an initial lesion upon the lower lip through promiscuous use of towels in an industrial institution where he was employed. This had not been recognized as being of a specific nature until three months after its appearance, when I first saw him. He then had a very sore throat and the characteristic rash over the body. The patient also complained of extreme muscular weakness.

I began treatment, administering daily injections of 10 minims each. At that time the chancre was indurated and the entire lip much swollen. Daily injections were continued for thirty days, when the chancre had entirely healed and the throat was in very good condition. During a second month injections were given every second day, after which no further treatment was required. This case was treated four years ago. There has been no recurrence of the trouble.

Case II.—Male. Age 35. Married. Ten years ago he contracted syphilis, which was treated in a desultory way for some time, when the patient gained his physician's consent to marry. Two healthy boys were born. His wife also escaped infection. After repeated recurrence of tertiary manifestations at varying intervals, a violent ulcerative process involving the entire soft palate and extending into the posterior nares so mutilated the parts that nasal respiration was completely suspended; at the same time the patient was rendered quite deaf by occlusion of the eustachian tubes. This was five years ago when I first saw the patient, and I found a truly unpromising condition present. The posterior nares was completely obstructed. The uvula had lost its normal supports and was anchored down behind the remnant of the right faucial pillar. The patient was thoroughly uncomfortable and suffered from a deoxidized condition of the blood incident to the mutilization of the pharynx and trachea.

I placed this patient upon 10-minim daily doses of the mercury benzoate solution, and did a resection of the posterior nasal vault, getting a free air passage through the normal channels. Injections were continued; and at the same time a large bougie was passed daily through the nares, with local treatment to the trachea.

At the end of three months all of the syphilitic lesions had healed, allowing unobstructed respiration. Hearing in the right ear was perfect, but the left tube remained occluded, with hearing decidedly impaired. All treatment in this case was suspended three years and a half ago, and at the present time the patient is in the best of health. He has taken on flesh and expresses himself as feeling perfectly well. A third boy was added to the family about two years ago, who is healthy and vigorous.

There is probably no syphilitic case more intractable to either medical or surgical treatment than stricture of the rectum. Careful, scientific surgical interference is often followed by disappointing, if not disastrous, results. It is for this reason that I beg the reader's indulgence while I give the following brief history of such a case:

Case III.—Female. Age 45. She had contracted syphilis from her husband early in her married life, which manifested itself by a variety of lesions, notably stricture of the rectum. This had been operated upon by a capable surgeon, but the patient was in a worse condition following the operation than before—in fact, there was almost complete occlusion of the bowel. I first saw the patient while in this pitiable condition and advised a radical operation, which was agreed to. Immediately afterwards I placed the patient upon 10-minim doses of the mercurial benzoate solution, which were continued daily. The wound in the bowel healed kindly without any contraction, and at the end of sixty-days' treatment the patient was discharged.

Three years have elapsed since that time and there has been no recurrence of symptoms.

I shall not further prolong this recital of case reports. Suffice it to say that my experience with mercurial injections warrants me in concluding that for directness of medication, promptness and permanency of results, as well as from the standpoint of comfort to the patient, no other method can compare with this. This remedy (anti-syphilitic lymph compound) is prepared by and can be secured from The National Laboratories, Pittsburgh, Pa. A fair, unbiased trial by those interested will give delightful, satisfying results.

In conclusion I make but passing reference to intravenous treatment. While recognizing that many of our ablest men are advocates of this method and conceding the right of their belief, it does not appeal to me as being as rational as the hypodermic method above outlined.

The advantages *claimed* for intravenous injection are: Absence of pain; absence of local accidents; absence of intoxication; mathematical dosage; immediate introduction of the curative agent in the organism.

Unfortunately, only the records of a limited few are made public, while the unfavorable experience of countless thousands of earnest plodders is never heralded. Of course quick action is obtained by any remedy intravenously injected, but the danger is undeniably greater, since it places in direct contact with the endocardium a toxic agent which may prove fatal.

I have seen Ehrlich administer salvarsan and know that it *is* painful; that reaction is frequently most severe and grave. In army base hospitals I have given and witnessed the giving of thousands of intravenous injections and seen such resultant pain, haematoma in many instances, death from syncope and paralysis of the heart, that, personally, I prefer the unquestionably safer, less painful, equally efficient method of hypodermic injection.

Finally, I can do no better than quote such accepted authority as Fournier, who gives as his reason for refusal of the intravenous method:

> First, because the method is somewhat delicate in technic, and requires a special apprenticeship. It is easy to miss the vein, to go on one side of it, or to go through it, etc. Besides, one does not always find veins sufficiently prominent for the operation, especially in women and obese subjects. Then there is often "the impossibility of finding a vein disposable after a certain number of punctures" (Blaschk.)
>
> 2. In the second place, the method is not always free from objections and accidents. Thrombosis, phlebitis of more or less severe character, periphlebitis (especially when the injection has been made outside the vein), buccal irritation, polyuria, diarrhea, etc., have sometimes occurred, without reckoning that it includes all the objections urged against the method of frequent injections without any compensatory advantages.
>
> 3. In the third place, because the therapeutic effects, whatever may be said of them, are not very encouraging, and do not seem superior to those of other methods. No doubt numerous cases of cure are found in the published observations, but there is nothing extraordinary, nothing resembling the brilliant, amazing cases, the dramatic therapeutic effects which are often produced by calomel and sometimes gray oil. Then there have also been failures (I do not count this as an objection, for is there any method which has not its refractory cases?) and, what is worse, somewhat frequent occurrences, even precurrences after short periods (Lewin, Dinkler, Gorl). Blaschko is of opinion that, on the whole, the treatment by intravenous injections, even in the secondary period, is less efficacious than mercurial inunction or intramuscular injection.
>
> 4. But to come to the main point, if intravenous injections have found only a limited number of experimenters, it is certainly because they are frightened. They are positively afraid, and I confess to being the first to be afraid of them. Rightly or wrongly, every one says in his inner conscience that it is perhaps imprudent to place the endocardium in direct and sudden contact with a toxic agent such as mercury, more especially as the experiments of Ullman are not reassuring on this point—not because he has seen animals die after intravenous injection containing rather large doses of mercury, but because in certain cases he has found *no lesions to explain death,* which allows us to suppose that death in these cases results from syncope, from sudden paralysis of the heart. I am willing to admit that up to the present time nothing of the kind has been observed in man; but every one reasons in this manner: "Is not this the history of chloroform and of cerebrospinal cocain-

ization, which produce no accidents in a thousand cases, but then, in the thousand and first, cause a catastrophe?" Such is the impression which I have derived from the inquiry of which I have just spoken, after opinions gathered from colleagues. "It is," most of them reply, "a curative method which I should not wish for myself, and for a very good reason; therefore, it follows that I do not wish it for my patients."

REGIMENTAL INFIRMARY,
3D UNITED STATES INFANTRY,
Camp Eagle Pass, Texas.

THE HENRY S. WELLCOME PRIZES

Competition open to all medical officers and former medical officers of the Army, Navy, Public Health Service, Organized Militia, U. S. Volunteers, and of the Reserves of the United States:

PRIZE FIRST: A GOLD MEDAL AND $300
PRIZE SECOND: A SILVER MEDAL AND $200

Competition for 1920 will be based on essays on prescribed subjects, as follows:

FIRST PRIZE.—"The Part of the Medical Department in Maintaining Military Morale."

SECOND PRIZE.—"The Hygienic Training and Treatment of American School Children in the Light of Experience Gained from the Military Draft for the World War."

Each competitor must furnish five copies of his competitive essay. Essays must not be signed with the true name of the writer, but are to be identified by a *nom de plume* or distinctive device. They must be forwarded to the Secretary of the Association of Military Surgeons of the United States, Army Medical Museum, Washington, D. C., so as to arrive at a date not later than *January* 15, 1921, and be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title and address. Essays must contain not less than 5,000 or more than 20,000 words, exclusive of tables. The envelopes accompanying the winning essays will be opened at the annual, or other meeting, by the president, and the names of the successful contestants announced by him. The winning essays become the property of the Association and will be published in THE MILITARY SURGEON. The writers of the essays receiving "first honorable mention" will be awarded life membership in The Association of Military Surgeons, U. S.

NOTE ON VALUE OF PROPHYLACTIC VACCINATION AGAINST PNEUMONIA

By Passed Assistant Surgeon L. A. BURNSIDE
United States Public Health Service (R)

IN COMPILING the following series of cases of pneumonia with the few remarks on influenza and vaccines, it is the desire of the writer that the reader will form a personal opinion after giving full consideration to the statistics presented here.

The facts in these cases were collected during the time that the writer was acting as camp epidemiologist at Camp Dix, N. J. The data include all cases of pneumonia occurring in this camp between the dates of January 1, 1919, and May 15, 1919. All organizations stationed in this camp, permanent camp personnel, and returning troops have been recorded on the table shown below.

Beginning about December 1, 1918, all soldiers who cared to be were vaccinated against influenza and pneumonia. A careful record was kept for epidemiological purposes and with these records the writer desires to show the benefits, if any, that might be derived by the prophylactic vaccination against pneumonia.

The fact must be taken into consideration that there has been a very noticeable advancement toward the prevention, by vaccination, of contagious diseases. Diseases such as smallpox, diphtheria, typhoid and other colonic forms have by statistics been shown to have remained practically nil, while pneumonia and catarrhal infections were running amuck.

I am of the opinion that the medical profession still has a very busy time ahead. The fact that from the beginning of mobilization until about the date of May 15, 1919, there were approximately 97,000 deaths in the American Army, from all causes. Forty-eight thousand of these deaths were from diseases and forty-thousand of this number (including those caused from influenza pneumonias) were caused by pneumonia.

In as few words as possible I wish to show that as far as we have progressed in vaccine therapy, the following facts have been fairly well established and accepted: That foreign protein substances or cells, introduced into the tissues of an animal, will be destroyed by something within the fluid tissues or leukocytes of that animal; repeated injections of these cells or protein substances into the tissues of a certain animal, as certain types of bacteria (killed) will raise the resisting power of the tissues of this animal to this particular protein until large doses of this type of protein may be injected without harmful results. This animal is now immune to this particular brand of bacterial protein or the bacteria themselves.

The immunity in different hosts and different types of bacterines vary over periods of from a few weeks to years and even a lifetime. The reason for this has not been thoroughly established, particularly with streptococcus and pneumococcus, the prevailing types in pneumonia, make it appear that increased resistance and immunity are of short duration and low degree. This, in my opinion, explains the fact why we are experiencing re-occurrence of influenza and pneumonia following prophylactic vaccination against these diseases.

From personal observation, I believe that all strains of bacteria are not suitable for immunizing purposes, especially in diseases in which immunity is not produced by the disease itself. Pneumonia is in this class with Pfeiffer's bacillus (micrococcus catarrhalis). Immunity may be established against certain types of bacteria by introduction of other types as in the colon types. This probably applies in those types closely related in straining properties as well as the symptoms produced in the host.

Vaccines are of undoubted value in increasing resistance against the development of certain diseases and that they have curative properties is certain. The type of strain must surely be found out before preparing immunizing proteins for introduction except in the few cases mentioned above. The question is still unsettled as to producing immunity to any appreciable degree in diseases in which the disease itself does not produce immunity.

The following list of cases are in a way self-explanatory. A few additional words will assist in the study and explanation. It will also be noted that in arranging these cases in the following manner, we may arrive at the average as to the character (lobar or broncho) and the types. The cases which are undetermined as to types were too far advanced to be typed. It will be noted also that six of these cases (8⅓ per cent) developed pneumonia following vaccination against this disease.

Total number of cases	72
Number died	3
Number vaccinated who developed disease	6
Number died who were vaccinated	1
Number of above developing broncho	46
Number of above developing lobar	26
Number showing Type I	6
Number showing Type II	1
Number showing Type III	0
Number showing Type IV	53
Number undetermined as to type	12

It will be noted that:

One case developed the disease thirteen days subsequent to vaccination.

One case, one month subsequent to vaccination.

One case, one month and twenty-two days subsequent to vaccination.

One case, two months and four days subsequent to vaccination.

One case, two months and five days subsequent to vaccination.

One case, two months and fourteen days subsequent to vaccination.

These cases occurred in every permanent organization in camp and a majority of cases were from the permanent camp personnel, although all the returning troops were assigned to battalions in the 153rd Depot Brigade from the time they arrived in camp and to date of discharge.

The cases among the "Oversea" troops are recorded on the following table as "not vaccinated." None of these particular organizations had received vaccinations while in France.

No. of case	Organization	Character	Type	Vaccinated	Disposition
1	153 D. B. Co. 63	Broncho	2	No	Duty
2	153 D. B. Co. 14	...do	4	No	Do.
3	B. H. Med. Det	...do	(1)	No	Do.
4	153 D. B. Co. 62	...do	4	No	Do.
5	Conv. center	...do	4	No	Do.
6	Conv. center	Lobar	4	No	Do.
7	Casual	Broncho	4	No	Do.
8	Q. M. C	Lobar	4	No record	Do.
9	Q. M. C	Broncho	(1)	No	Do.
10	U. S. G	...do	(1)	No	Do.
11	50th Inf. Hq	...do	4	No	Do.
12	153 D. B. Co. 14	...do	4	No	Do.
13	153 D. B. Co. 63	...do	4	No	Do.
14	153 D. B. 6th Bn	Lobar	4	No	Do.
15	Q. M. C	Broncho	(1)	No	Do.
16	153 D. B. Co. 13	...do	4	No	Do.
17	413 R. L. Bn	Lobar Feb. 28, 1919	4	Yes Jan. 6,1919	Do.
18	Casual	Broncho	4	No	Do.
19	153 D. B. Co. 52	...do	1	No	Do.
20	153 D. B. Rec. Det	Lobar	4	No	Do.
21	50th Inf. Co. L	Broncho	4	No	Do.
22	413 R. L. Bn	...do	1	No	Do.
23	Casual	...do	1	No	Do.
24	153 D. B. Co. 34	...do	4	No	Do.
25	153 D. B. Co. 33	...do	(1)	No	Do.
26	50th Inf. Co. G	...do	(1)	No	Do.
27	153 D. B. Co. 52	...do	4	No	Do.
28	338th Inf. Co. I	Lobar Mar. 20, 1919	4	Yes Jan.6,1919	Died.
29	Q. M. C	Lobar	4	No	B. H.
30	338th Inf. Co. A	Broncho	4	No	B. H.
31	338th Inf. Co. M	...do	4	No	B. H.
32	338th Inf. Co. F	...do	4	No	B. H.
33	153 D. B. Co. 14	Lobar	4	No	B. H.
34	50th Inf	Broncho	4	No	B. H.
35	Prov. Det. Co. 6	Lobar	4	No	B. H.
36	Conv. center Co. 1	Broncho	4	No	B. H.
37	153 D. B. Co. 48	...do	4	No	B. H.
38	153 D. B. Co. 21	Lobar	4	No	B. H.
39	153 D. B. Rec. Det	...do	4	No	B. H.
40	153 D. B. Co. 6	...do	4	No	B. H.
41	Oversea Conv	Broncho	4	No	B. H.
42	Conv. Center	...do	4	No	B. H.

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[1] Undetermined.

No. of case	Organization	Character	Type	Vaccinated	Disposition
43	413th R. L. Bn.	Lobar Mar. 20, 1919	4	Yes Jan.16,1919	B. H.
44	153 D. B. Co. 14	Lobar	4	No	B. H.
45	Med. Corps	Broncho	4	No	Duty.
46	50th Inf. Hq	Lobar	4	No	Do.
47	314 Inf. Co. 6	...do	4	No	Do.
48	153 D. B	...do	(1)	No	Do.
49	153 D. B	...do	4	No	Do.
50	B. H. Med. Det	Broncho	(1)	No	Do.
51	153 D. B	...do	1	No	Do.
52	153 D. B	Lobar	4	No	Do.
53	153 D. B	...do	1	No	Do.
54	153 D. B	Broncho	(1)	No	Died
55	50th Inf. Hq	Lobar	4	No	Duty
56	U. S. G	Broncho	4	No	Do.
57	153 D. B. Co. 33	...do	4	No	Do.
58	153 D. B. Co. 33	...do	(1)	No	Do.
59	413 R. L. Bn	Lobar Jan. 20, 1919	4	Yes Jan.7, 1919	Do.
60	Casual	Lobar	4	No	Do.
61	153 D. B. Co. 51	Broncho	(1)	No	Do.
62	153 D. B. Co. 16	...do	4	No	Do.
63	153 D. B. Co. 16	Lobar	(1)	No	Do.
64	Casual	Broncho	1	No	Do.
65	153 D. B. Co. 52	Lobar	4	No	Do.
66	Q. M. C	Broncho	4	No	Do.
67	153 D. B	...do	4	No	Do.
68	153 D. B	Lobar	(1)	No	Do.
69	153 D. B. Co. 63	Broncho	4	No	Died
70	153 D. B. Co. 47	...do	(1)	No	Duty
71	50th Inf. Co. A	...do Mar. 7, 1919	4	Yes Feb.7,1919	Do.
72	413 R. L. Bn	Broncho Mar. 20, 1919	4	Yes Jan.15,1919	B. H.

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[1] Undetermined.

In conclusion I desire to present a few remarks and facts in reference to the great world-wide pandemic of influenza which began late in 1918, knowing as we do that the majority of our pneumonias have been the direct result of influenza.

It is probably the first time in history that the powers of a fairly universally established Public Health Administration have been challenged. We should not be afraid to recognize and confess that some of our most cherished hopes and beliefs in the combatting of epidemics have been very much shaken by this late pandemic. We should not with obstinacy and false pride attempt to still believe and advocate some of the technical and administrative policies which have been tried and found wanting.

We should not fail to realize the fact that different infections and epidemics demand different methods as to preventions in the official administration of the methods of prevention. That it is not possible as yet to handle an epidemic of influenza as one of smallpox or typhoid by vaccination and a few lesser methods of prophylaxis.

PROTECTIVE VALUE OF PNUEMOCOCCUS VACCINE AGAINST RESPIRATORY DISEASE

By Major BERTRAM F. DUCKWALL
Medical Corps, United States Army

IT HAS been known for some time that a vaccine composed of killed cultures of the pneumococcus will exert a considerable protection against the pneumonias, particularly those due to Types I, II, or III pneumococcus. No one has yet called attention to the fact that the vaccine not only confers a degree of immunity against pneumonias, but also against influenza and common respiratory disease. The vaccine employed in the Army is a saline suspension of Types I, II and III pneumococcus containing a 1,000 organisms to the cubic centimeter. The first inoculation is one-half cubic centimeter injected under the skin at the insertion of the deltoid. The second and third doses are a cubic centimeter each and given after intervals of seven to ten days. The only precaution used is to take the individual's temperature and to make certain that he is not suffering from respiratory disease of any kind at the time.

During the winter of 1919–20 at Camp Taylor 1,173 men completed the three inoculations against the pneumococcus, 263 men received two doses, and 119 men received but one injection. Some of these men were discharged, furloughed to the reserve or were transferred out of the camp at some time within the period from January 1, 1920, to April 30, 1920, and it was decided to rule them out of the calculations, for the reason that no reliable data could be obtained after they had left the service, as was the case with the majority. One hundred and seventy-one of those who received three inoculations, 51 of those who received two, and 7 of those who received one dose were thus ruled out, leaving the following figures for the compilation of statistics:

1,002 men received three inoculations.
212 men received two inoculations.
112 men received one inoculation.

1,326 men received one, two, or three inoculations.

For the purpose of comparing the incidence of respiratory disease among the vaccinated and the unvaccinated, the four-month period commencing January 1 and ending April 30, 1920, was selected, because this period was replete with respiratory disease, especially with influenza which broke out in the camp about the middle of January and ended the middle of March. During this four-month period the mean strength of command for the camp was 7,146. This number was fairly constant and it is a safe assumption that the majority of the men were exposed to the conditions peculiar to the station during that time. Of the 7,146 men in the camp, 1,326 received one, two, or three inoculations; consequently there were 5,820 men who did not receive any inoculation whatever.

A careful check of the records of the hospital and the various infirmaries was made and the total number of cases of pneumonia, influenza, tonsillitis, bronchitis, coryza, and pharyngitis tabulated with regard to whether the patients had received the pneumococcus vaccine. Rates per 1,000 per annum were calculated by multiplying the rate per 1,000 for the four-month period by three.

Admission Rate per 1,000 per Annum for Respiratory Disease

	Pneumonia	Influenza	Tonsillitis	Bronchitis	Coryza	Pharyngitis
3 inoculations	14.9	38.7	47.7	20.9	14.9	5.9
2 inoculations	0	42.3	14.1	0	0	0
1 inoculation	107.1	267.6	0	0	0	0
1, 2, 3 inoculations	20.3	58.8	36.0	15.8	11.3	4.5
Unvaccinated	54.0	249.3	211.8	153.0	56.1	41.1

It will be noted that the rate among the unvaccinated is very much higher than among the vaccinated, proving that some degree of protection against the common respiratory diseases as well as against pneumonia is afforded by the pneumococcus vaccine. Just why the pneumococcus vaccine should protect against influenza and other respiratory diseases is a matter for further study. It is quite probable that the rôle of the pneumococcus in the causation of these conditions is of considerable importance.

It is certain that all men who were stationed at Camp Taylor during the period of the 1920 influenza epidemic were exposed, as no measures limited the spread of the disease. It could not be said that the method of washing mess paraphernalia was a factor in the spread, as all dishes and mess-kits were boiled. It is much more probable that the nasopharyngeal secretions—"droplet infection"—were the greatest single cause of the widespread character of the epidemic.

Death Rate per 1,000 per Annum for Pneumonia

3 inoculations	2.99
2 inoculations	0
1 inoculation	0
1, 2, 3 inoculations	2.26
Unvaccinated	8.76

There was one death only among the vaccinated and this was a lobular pneumonia following influenza. There were so many cases of influenza and pneumonia at the time that no attempt was made to type the causative organisms in the pneumonias which developed, or even to ascertain whether a pneumococcus was responsible for the disease or not. The single death, however, gave an annual rate per 1,000 of 2.99 as against 8.76 for the unvaccinated. The conclusion to be drawn, of course, is that the vaccine protects against all pneumonias in the proportion of three to one; that is, that there will be three times as many cases of pneumonia die among the unvaccinated as among the vaccinated in a year's time.

It seems advantageous for purposes of comparison to lump all statistics for pneumonia and the common respiratory diseases under one head and formulate another table:

Admission Rate per 1,000 *per annum for Pneumonia and Common Respiratory Diseases*

3 inoculations	143.7
2 inoculations	56.4
1 inoculation	375.0
1, 2, 3 inoculations	149.4
Unvaccinated	714.3

The obvious conclusion is that the vaccine protects against pneumonia and the common respiratory diseases in the proportion of five to one.

These figures have been collected in an unprejudiced manner in the ordinary routine work of the Sanitary Inspector's Office. The writer hopes that the publication of these statistics will stimulate others to look over their records and that other figures will be available with reference to the results of the pneumococcus vaccine at a very early date.

MEDICAL HISTORY OF GENERAL SCOTT'S CAMPAIGN TO THE CITY OF MEXICO IN 1847

LIEUTENANT COLONEL LOUIS C. DUNCAN
Medical Corps, United States Army

(Concluded)

Molino del Rey.—The armistice was not of long duration. An American supply train in the city of Mexico was fired on, and it was learned that the Mexicans were all the time strengthening their forces and defenses. General Scott determined to resume hostilities and on September 7 prepared to attack some stone buildings held by the enemy to the north of Tacubaya and west of Chapultepec. These were a foundry known as Molino del Rey and a strong work called the Casa Mata. The two were connected by stone walls offering excellent shelter for troops. General Scott believed that the Mexicans were removing the church bells from the city and casting them into cannon at Molino, but this was found later to be incorrect.

The Army was still at Tacubaya, Mixcoac and San Angel, with the depot at Mixcoac. The hospital seems to have been moved to the latter place on September 8. It was in charge of Surgeon J. J. B. Wright. General Order No. 4, of September 7, provided: "The sick and wounded, the spare means of transportation, tents and stores of Quitman's and Twiggs' Divisions will be placed in general hospital and Depot at Mixcoac. . . . Mixcoac will be the general hospital and depot of Pillow's Division also."

Mixcoac is immediately south of Tacubaya, with a good road and but two miles from Molino del Rey. The Bishop's Palace, west of Tacubaya, was also on September 6, taken for a hospital and placed in charge of Assistant Surgeon Josiah Simpson. These moves were in preparation for the expected battle. General Scott's headquarters were then at the Bishop's Palace.

The task of taking Molino del Rey and driving the Mexicans from the vicinity was assigned to General Worth; but on his representations of the enemy's strength his division was reinforced by the brigade of Cadwalader and three squadrons of Dragoons under Major Sumner. These troops, about 3,200 in all, were placed in position during the night of the 7th and the attack made at dawn on the 8th. The assault was frontal and the enemy found to be stronger than had been anticipated. Troops had been put in motion as early as three o'clock—a favorite hour during the entire campaign. The columns advanced bravely across the open to attack those stone walls and buildings. They were finally captured, but not without heavy loss. A picked column advancing against the Casa Mata was met by a blasting fire which struck down eleven of its fourteen officers and was forced to recoil. The attack here failed at the very parapet; but the enemy's supporting cavalry being driven off by Major Sumner, and guns brought up, a heavy cannonade compelled the Mexicans to abandon the place in flight. Their lines were entirely broken and their troops retreated in confusion, leaving only the castle hill of Chapultepec between the invading American Army and the city. Again a prompt advance would probably have overrun Chapultepec and given entrance to the city; but no preparations for such a move had been made. The works taken were blown up, and the troops returned to Tacubaya. Hitchcock says there was much grief in the Army that night over the losses in this unnecessary battle. The 5th and 6th Infantry lost almost half their number in a reckless assault on the Case Mata, not even waiting for artillery. When the guns came up they alone drove out the defenders. The battle was ended and won by 7.30 o'clock in the morning.

There was an unfortunate incident in the attack which a knowledge of the psychology of soldiers might have prevented. As related by Colonel Hitchcock, "General Worth ordered an assaulting column of 500 old soldiers, to be selected from his division, to be formed in five companies, under Major Wright of the 8th Infantry. The effect was to separate officers from their men, to put men side by side in the conflict who did not know each other, and, above all, to separate men from their colors. This last was a very serious matter, for every regiment has its own name and its own glory, under its own colors. It is remarkable that this assaulting column of veterans was broken, and about 150 men absolutely ran a hundred yards before they could be rallied. But the remnants of the same regiment (recruits) charged the Hacienda, equally well defended, or better, without any break at all." The Colonel concluded that the formation of a column taken from all regiments took no note of morale and was ill-advised.

Losses at Molino del Rey were the heaviest proportionately of the war. The whole division lost 25 per cent of its strength, and the 5th Infantry lost 38 per cent of the men it carried into the fight. The forces engaged were said by General Worth to have numbered 3,100. They were: Worth's Division, 2,266; Cadwalader's Brigade, 816; Cavalry and Artillery, 365; total, 3,447. Other troops were brought up and at hand but not used. The losses were: killed, 116; wounded, 665; missing, 18; total, 779. After the battle the Army numbered but 7,000 effectives, and Worth's Division was reduced from 2,200 to 1,400. The loss in horses was: killed, 37; wounded, 92; missing, 4; total, 133.

Of the scenes following the battle a newspaper writer said:

> Having been directed to withdraw to Tacubaya, wagons were sent for and the mournful task was commenced of collecting our dead and wounded, which occupied us several hours—the enemy all the while firing from Chapultepec, and particularly at the wagons. . . . Our loss amounted to 787, a little more than one fourth the command. In Wright's charge on the enemy's center, 11 out of 14 officers were cut down, and the men suffered in very nearly the same proportion. On the day after the battle the honored dead were interred with the rites of war on the heights of Tacubaya. The service of the Episcopal Church was read, General Worth attending.

General Worth, in his report, said of the medical officers:

> It is again my grateful duty to present to the General in Chief those ever faithful and accomplished medical officers: Satterlee, Wright, Simpson, Simmons, Deyerle and Roberts. The last named, when the men of his regiment were almost deprived of commanding officers, assumed the duties of his fallen comrades and was desperately, probably fatally wounded.

This was Assistant Surgeon William Roberts, U. S. Army, who was mortally wounded and died a short time afterwards. Colonel Lugenbeel of the 5th Infantry has described the incident. He said:

> At the battle of Molino del Rey Surgeon Roberts established his attendants in rear of the regiment (5th Infantry) in a slight hollow, so as to be protected from fire. When the line advanced I did not see the doctor. Soon after I saw Lieutenant Hamilton of Company I stagger and fall, as if severely wounded. Surgeon Roberts ran to him from the rear, and, after examining his wounds, started forward to the line of battle. I called to him to go back, but he pointed to Hamilton's company and ran on. When next I saw him he was lying on the field with the wound in his forehead which afterwards caused his death. Lieutenant Hamilton informed me that Surgeon Roberts sent him to the rear and then went forward to take command of his company, as it was without an officer. At Cherubusco he had attempted the same thing, but I was near enough to see him and sent him to the rear.

Surgeon Roberts was taken to Surgeon Simpson's hospital at the Bishop's Palace. The ball had carried away a portion of the left frontal bone, exposing the cerebrum. An abscess formed inside the cranium and he died in convulsions a month later, October 13, in the city.

As stated, the wounded were taken to Tacubaya and Mixcoac, on stretchers; but it became necessary to use army wagons. These rough wagons were loaded with the wounded, and the jolting doubtless contributed to the excessive mortality which ensued. Soon after the battle it was found that the Bishop's Palace was in range of the guns on Chapultepec, so on September 12th the hospital was removed to Mixcoac. The wounded of the other commands, few in number, had been taken to Mixcoac and San Angel. Surgeon Wright was in charge of the main hospital at Mixcoac and had ten assistants. The wounded remained there until after the capture of the City, on September 14th.

Chapultepec and Mexico City.—After the contest at Molino del Rey nothing but the hill of Chapultepec intervened between the American Army and the Gates of the City. This hill, some 200 feet high, is and was then crowned by a stone palace—in reality a fortress, with guns and a garrison of a thousand men. The city had no walls but was surrounded by deep and wide ditches or canals. Outside the canals were marshes, remains of the lakes which surrounded the city in the time of the Aztecs. These marshes were crossed by a network of smaller ditches and were generally impassable for troops, except by the great causeways leading to the gates. Readers of Prescott will remember these elevated roads through the lakes and the terrible conflicts on them between the mailed *Conquistadores* and the myriad Aztec warriors. The main southern highway, the Acapulco road, has already been mentioned. It led to the Gate of San Antonio Abad. It was by this road that Cortez made his second entrance into the City. Another road led from Coyacan to the Gate de los Ninos Perdidos. These southern roads had been abandoned for others leading in from the west.

From Chapultepec two roads enter the City. After careful reconnaissance it was decided to carry Chapultepec by assault and then advance on the City by one or both these roads. The southerly, or Chapultepec Causeway, led almost directly eastward, to the Belem Gate. Another road led northward from the hill for three-quarters of a mile, there intersecting the San Cosme Causeway, which passes eastward to the San Cosme Gate. These so-called gates were the large stone buildings of the customs service, situated at bridges over the canal, and defended by earthworks and guns. The causeways had also been cut by cross ditches and earthworks, making approach as difficult as it had been for the Spaniards. The San Cosme Causeway was the road by which Cortez had retreated on the *triste noche.*

On September 12 the divisions of Worth, Pillow and Quitman were concentrated near Chapultepec. Twiggs was left to threaten the southern gates. One of Twiggs' brigades was at Mixcoac, guarding the depot, hospital and trains. Strong batteries were prepared to play on the hill; recent captures had given a plentiful supply of ordnance. Two small storming columns were formed, with two divisions in support. After a heavy bombardment on the 12th, the assault was delivered at daylight on the 13th. The small column first made the attempt, but soon almost the entire army was swarming about the hill, attacking it from all sides. It was captured after considerable loss.

The mistake of halting when the enemy was beaten and demoralized was not repeated here. The place having been carried before noon, the troops were promptly reformed and pushed forward toward the City. Worth's Division advanced along the northern causeway toward the San Cosme Gate; Quitman's Division followed the southern road to the Belem Gate. Each of these causeways consisted of an elevated double roadway, with an aqueduct carried on arches in the middle. These arched aqueducts served as covered ways, or approaches, and without them the columns could not have advanced with so little loss. Yet the demoralization of the Mexicans was such that they abandoned some of their works, and on the whole made little resistance outside the gates. Twiggs' brigades followed in support of the columns, leaving the 15th Infantry as a garrison at Chapultepec.

Worth's Division effected a lodging in the suburbs, brought guns up to batter the Gate, and by dark were securely lodged inside the walls, throwing shells far into the City. It was not intended that Quitman's column should do more than threaten the Belem Gate, which was the stronger of the two and commanded by the guns of the citadel. But Quitman pushed on and overthrew all opposition. The Mexicans became demoralized and abandoned their guns. The Belem Gate was captured by dark and the troops halted inside the walls, only waiting for daylight to attack the citadel.

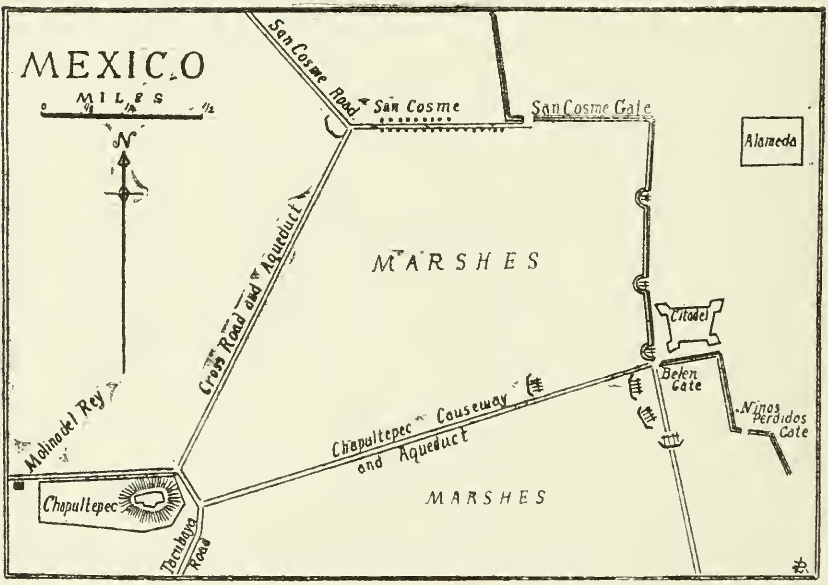


FIG. V

About four o'clock the next morning, September 14th, a deputation from the Ayuntamiento waited on General Scott, informed him that the Federal Government and army had fled during the night, and asked for terms of capitulation. The General refused to sign any terms, saying that he would levy a contribution and that the American

Army would enter on its own terms. General Grant may have derived some of his ideas from Scott, who had severely blamed Worth for agreeing to a capitulation at Puebla. Worth and Quitman were ordered to advance cautiously toward the heart of the City. Worth was halted at the Alameda; Quitman proceeded to the Grand Plaza. The American colors were raised over the National Palace, and the campaign was practically ended. There was some desultory firing by snipers in the streets that day, and an engagement or two on the National Road later, but the goal of the expedition had been reached and the Mexican Government, though it prolonged the step, had received the blow which compelled it to agree to the terms of peace.

Losses in the engagements of September 12, 13 and 14 were: killed, 130; wounded, 703; missing, 29; total, 861, out of 7,180 engaged. Total losses in the various engagements befeore the capital amounted to 2,703, or more than 25 per cent of the army that left Puebla.

The wounded from Chapultepec were taken to Mixcoac; those from before the gates were collected and taken to hospitals which were at once formed inside the City. It appears that division hospitals were at first established in convents and other buildings. Wounded from the various regiments were collected in them, but each regimental surgeon attended the wounded from his own regiment, under the supervision of the division surgeon, who was required to visit the hospital at a fixed time every day. This was the first division hospital in the Army and has the earmarks of a scheme of Tripler's; a mere collection of regimental hospitals. Stewards, nurses and cooks were also detailed from the regiments sending patients, and such regiments were required to divide a portion of their hospital funds with the division hospital. The sick seem to have been fairly well provided with funds at this time. General Scott levied a contribution of $150,000 on the City, to be expended as follows:

$20,000 for the sick in hospital.
$90,000 for gratuitous issue of blankets and shoes.
$40,000 for other military purposes.

On December 16, 1847, the sick were all collected in one general hospital, established in the Bishop's Palace, the Governor's Palace, the College of Mines, the Iturbide Palace, the Palace of the Inquisition, and the Convent of St. Isabella. This hospital was in charge of Surgeon Chas. Tripler, aided by Assistant Surgeons Simpson, Cooper, De Leon and Campbell. The hospitals conducted in these buildings were generally unsatisfactory and sickness among the troops continued as before. Assistant Surgeon Simpson said of them:

> The buildings used in Mexico for hospitals were entirely unsuitable for the pur-

pose, being constructed on interior courts, on which the doors and windows opened. Built of rubble masonry, with floors of brick or tile, without chimneys; they were deficient in light, ventilation and means of warming; cold, damp, dark, and cheerless; they were a fruitful cause of the low forms of fever and bowel affections so prevalent in the tropics.

The October sick report of the Regulars shows:

Mean strength	5,724
Remaining	1,582
Received	3,934
Died	234
Rate	500

In November, with an average strength of 8,435, there were 142 deaths, a rate of 200 per thousand per annum; or eight times that of the Spanish-American War. On December 4 there were 6,000 Regulars fit for duty and 2,041 sick. On January 6, 1848, there were 11,162 for duty and 3,802 sick, or more than 25 per cent.

Some light is thrown on the surgical practice of the day by the experiences of Captain Robert Anderson (later of Fort Sumter fame). Captain Anderson received a musket ball in the right shoulder during the attack on Molino del Rey, on September 8th. Writing on the 22d he said:

> Doctor Harney, Medical Director of the Army, came to see me and told me that the ball was in but would do no harm. Without probing the wound or allowing anything to be done to give me pain, he ordered a poultice of bread and milk applied. . . . The wound is about three inches below the point of the shoulder, and Dr. Steiner (who probed the wound) thinks the ball is under the knot of muscles under my arm. On the 11th I was taken in my old camp bed-cot to Mixcoac; remaining there until the 18th, when I came to the city; my cot being placed as it stands in an ambulance.
>
> September 24. Dr. Steiner has changed my dressing, having given me a simple layer of lint, held by strips of adhesive plaster.

It seems he was able to go about the city at this time, although he had an attack of malarial fever and took much quinine. The wound did well, and on October 1 he thought he could return to duty by the 10; but the knowledge that he might return to the States had a bad effect on his recovery, and on October 24 he obtained a certificate of disability for two months and departed for Vera Cruz and the North.

Lieutenant Stevens, heretofore mentioned, was wounded on the 13th, a ball perforating the foot and fracturing some of the metatarsal bones. He says that he was wounded at 1.30 and the ball was cut out at once on the field. By 3.30 o'clock he was in the hospital at Tacubaya. Quick work for any army! At the hospital he was treated by Assistant Surgeon J. K. Barnes (afterwards Surgeon General) and on the 14 was sent to quarters in the City. On the 15th Dr. Barnes began applying poultices and the patient got along well for a month, sitting up for the first time on October 11. From October 12 to 24 the wound was worse, sloughing and requiring poultices. On November 14 a good sized piece of leather was discharged from the wound. On November 20 he went out for the first time, and on December 9 left for Vera Cruz, in what he says was a "tolerable ambulance." The foot never fully recovered and he was obliged to wear a shoe with a special sole. Lieutenant Stevens became a brigadier during the Civil War and was killed at Chantilly, along with Kearney.

Conclusions.—The capture of the City of Mexico practically ended the war. Santa Anna made several attacks on the line of communications, which had been reëstablished, but was beaten off in every attempt and soon gave up the contest. Troops and hospitals were maintained in the City until the end of the year. The place was unhealthful. The large lakes adjacent were twenty feet higher than the level of the streets. Filthy water and sewage stood permanently within two feet of the level of the ground. All contagious diseases flourished, even in the wintertime. By December the regiments were reduced to two hundred or one hundred and fifty men, with but six thousand for duty in the whole Army. Regiments that had scarcely arrived were soon reduced, without firing a gun. Wright complained that regiments reached Vera Cruz with but one or two per cent of sick, and after a delay of a few weeks left ten or twenty per cent of sick there when they marched. Others were left at Jalapa, Perote and Puebla, so that the regiments reached the City much depleted and thoroughly infected with disease. Of those left behind one-fourth to a third died and the remainder were discharged for disability.

A short sketch of the history of the First South Carolina, or Palmetto, Regiment, will give a good idea of the ravages of disease in an average case. This regiment landed at Vera Cruz with about 650 men and seems to have marched at once, avoiding the city. Disease was not avoided, however, for the surgeon, C. J. Clark, says that 130 or 140 were left sick at Jalapa. Puebla was reached about May 24. From that date to June 30 there were 34 deaths there; sixty of those left at Jalapa had died and the remainder were discharged for disability. The quarterly report on September 30 shows 89 deaths, 21 from gunshot wounds and nearly all others from dysentery. The quarterly report for December 31 shows an average strength of but 334; 19 had died, 54 had been discharged for disability. This regiment lost half its strength in nine months, and nearly all by disease—dysentery.

The 1st and 2d Pennsylvania, which left home 1,800 strong, lost 400 men by disease. More than half the Georgia Battalion died in

Mexico. The 4th Tennessee (759 men) lost 360 of 760, who died of disease without ever having been engaged. The disease causing the great majority of these deaths was not the dread *vomito*, but dysentery; and the troops returning to the United States carried it with them. A considerable number of the returning troops were encamped at East Pascagoula, Mississippi, from July, 1848, to the end of the year. Although there was an epidemic of yellow fever in New Orleans that summer, with 8,000 deaths, there were but fourteen deaths from the disease in camp. Diarrhea and dysentery caused over a hundred deaths.

It is a matter of record that following the return of the Army from Mexico a widespread epidemic of dysentery visited the United States. The number of deaths from this disease in Massachusetts prior to 1846 averaged 236; from 1847 to 1850 it varied from 1,074 to 2,455, dropping to 441 in 1860. A committee of the American Medical Association reported the general prevalence of dysentery throughout New England in 1848. Other reports showed an unusual amount of this disease throughout the Central, Southern and Western States. The census of 1850 reported 20,000 deaths from dysentery; that of 1870, but 8,000. It is clear the dysentery, although endemic in Mexico, was the chief cause of disease and death in the Army there, and that returning troops carried it to the whole country.

The care of the wounded was a little more satisfactory, but, on the whole, not to be imitated. The surgeons were personally competent, even energetic, and devoted to the Service; but there was no organization, no plan for handling the wounded as a whole problem. Regimental surgeons followed their regiments into battle and attended the wounded very close to the firing line. After the battle the few wounded were collected in some improvised hospital and there cared for until cured, or died or invalided. With no hospital corps and no ambulances, the wounded were gathered in wagons, by details of men, and so hauled to the general hospital. There were no field hospitals and no hospital tents. The sick and wounded were not, as a rule, evacuated to the rear, and there was no service of the rear, properly speaking. The comparatively small size of the Army and the uniform series of victories made the collection of the wounded a rather simple task. The fighting seldom lasted more than an hour or two, the wounded were but a few hundred, and the field was free and open for wagons. It cannot be said that evacuation to the rear was advisable. The base, at Vera Cruz, was a plague spot to be shunned. The hospitals, at Jalapa, Perote, Puebla and Mexico City, were on the high tableland and the most healthful to be found; at least, more so than Vera Cruz or even

New Orleans and Baton Rouge. The hospitals themselves, though in unsuitable buildings, were the best available. They were, however, almost totally lacking in what today would be considered necessary hospital equipment. As a plain fact they had no equipment except such as could be found in such a country as Mexico. Moreover, the standard of equipment for military hospitals was then low. Newspaper correspondents appear to have been entirely absent beyond Vera Cruz; hence there were no loud complaints in the press. The soldiers themselves expected little in the way of tender treatment and were not surprised by its lack.

The work of the Medical Department during General Scott's campaign cannot justly be compared with a campaign today; yet it could scarcely be termed good when judged by any standard. In sanitation not much could be expected, since the underlying causes of infectious diseases were unknown. We have seen dysentery decimating the Army without hindrance. Medical officers had neither the necessary knowledge nor the requisite authority to eradicate it. Rank and definite status were not given them until the war had come to an end, and then largely because the necessity for this had been so thoroughly demonstrated. So the army surgeon was unable to cope with the principal disease—dysentery—as he has recently been unable to cope with pneumonia. But it must be remembered that the one disease which might have completely ruined the little army—yellow fever—was, by the good sense of General Scott and the assistance of medical officers, practically avoided. It may be said that the General had a more lively realization of the deadly nature of the disease than did the generals in Cuba fifty years later. This was due, no doubt, to the fact that he always consulted his medical advisors and had the chief of the service with him. The army in Mexico may be fairly compared with the armies in the Crimea, some ten years later. While the annual death rate from disease in General Scott's army was over 100 per thousand, the death rate of the British troops in the Crimea was over 200, and of the French it was above 300.

Already the reader will have seen that it was disease rather than Mexican bullets which weakened the army in Mexico. There were seven deaths from diseases of the camp to every death caused by battle injury. The volunteers who set out so cheerfully to win glory and fame, expecting to find in Mexico some such scenes of heroic adventure as Charles O'Mally found in the Peninsula, were soon disillusioned and too often fell victims of that peculiarly unheroic disease—dysentery. After weeks and months of misery and suffering they at length filled lonely graves. Colonel Edward Baker of the 4th Illinois Regiment recited on the floor of Congress some lines of his own composition which tell the story of the soldier in Mexico.

> "They did not die in eager strife, upon a well fought field,
> Nor from the red wound poured their life, where cowering foemen yield,
> Death's ghastly shade was slowly cast, upon each lowly brow;
> But, calm and fearless to the last, they sleep securely now."

These words express sadness that the soldiers died of disease instead of on the field of honor, as was the destiny of their author, but there is no regret that their lives were uselessly expended; that their deaths brought no victory. Disease and death among soldiers were so much a matter of course that there was no comparison of the lives well expended in purchasing victory with the lives thrown away and wasted through disease. Ten men of each hundred would die in the year; that excited neither criticism nor comment. It is doubtful if anyone made the necessary calculations to demonstrate what the death rate was, much less made feasible plans for its reduction.

Few encomiums can be passed on the Medical Department in Mexico. Nor do the officers appear to have learned or developed anything of importance in military sanitation, medicine or surgery. A few of them derived some experience from their labors, to be used later in the greater war which followed: Charles Tripler, R. S. Satterlee, J. M. Cuyler, Ebenezer Swift, Glover Perrin and others. J. K. Barnes became Surgeon General of the Army in 1864. All did honest and faithful work, but none originated anything. They left the Service about as they found it. The net results of the war were three; something more of actual rank for Medical Officers; the Soldiers' Home at Washington, and the system of retirement for officers of all branches of the Army. These appear to be due to the presence of the Surgeon General in the field, his standing with the General, and the approval of General Scott when he returned crowned with the laurels of his most successful campaign in Mexico. These are the only remaining monuments to the personal skill, courage and devotion of the medical officers of those far-away days and their generally unsuccessful contest with the grim Reaper in the Land of the Montezumas. It may at least be said that they did as well as they knew. They earned a share of the glory; they deserve to have their names preserved from oblivion.

APPENDIX

CASUALTIES

Old Regulars, 15,736, employed an average of 26 months.

Killed 463 D. of W. 329 =	792	Ratio 23.3 per 1000 per annum.
Died of disease	2,623	80
Discharged for disability	3,716	103
Deserted	2,247	70
	9,378	276.3

New Regulars, 11,186; average of 15 months.

Killed 69 D. of W. 76 =	143	10.2 per 1000 per annum
Died of disease	2,092	152.
Discharged for disability	893	65.
Deserted	602	43.5
		270.7

Volunteers 60,000; average 10 months

Killed 514 D. of W. 100 =	614	12.3 per 1000 per annum
Died of disease	6,236	121.4
Discharged for disability	9,216	184.
Deserted	3,876	77.
	19,942	394.7

COMPARATIVE RATES

	Killed	*Died of disease*	*Discharged*	*Deserted*	*Total*
Old Regulars	23.3	80.	103	7.0	276.3
New Regulars	10.2	152.	65	43.5	270.7
Volunteers	12.3	121.4	184	77.	394.7

TOTAL LOSSES

Killed and died of wounds	1,549	or 15.6	per 1000 per annum
Died of disease	10,951	111	per 1000 per annum
Discharged for disability	13,825	140	per 1000 per annum

PRINCIPAL ENGAGEMENTS

Place	*Date*	*Forces*	*Killed*	*Died of Wounds*	*Wounded*
Vera Cruz	March 9–29	13,000	9	3	51
Cerro Gordo	April 18	12,000	64	35	353
Contreras and Cherubusco	August 20	8,497	133	76	865
Molino del Rey	September 8	3,251	124	71	582
Chapultepec	September 13	6,000	138	50	673
Siege of Puebla	September 13–October 12		3		13

There were also 192 deaths from accident and 34 were hanged.

COMPARISON OF CASUALTIES IN DEPARTMENT OF TEXAS, 1850

Average strength	4,450	
Admissions to sick report	15,169	Rate 3543. per 1000
Deaths	279	Rate 62.7 per 1000
Rate excluding cholera		Rate 52.8 per 1000

Deaths from disease of the Army in Mexico—110 per 1000 per annum—may be compared with rates of 65 per 1000 in the Civil War and 16 per 1000 in the World War of 1917–18. The rates for the War of the Revolution and the War of 1912 will never be known.

PERSONNEL

MEDICAL OFFICERS AT VERA CRUZ AND ON THE MARCH TO JALAPA

Chief Surgeon:	Thomas Lawson, Surgeon General
Medical Purveyor	Surgeon J. J. B. Wright
Cavalry	Assistant Surgeon Hall

Mounted Rifles	Assistant Surgeon A. F. Suter
1st Artillery	Assistant Surgeon H. H. Steiner
2nd Artillery	Assistant Surgeon Chas. P. Deyerle
3rd Artillery	Assistant Surgeon L. H. Holden
4th Artillery	Surgeon J. M. Cuyler
1st Infantry	Surgeon B. F. Harney
2nd Infantry	Surgeon Chas. Tripler
3rd Infantry	Assistant Surgeon Chas. C. Keeney
4th Infantry	Assistant Surgeon James Simons
5th Infantry	Assistant Surgeon Burton Randall
6th Infantry	Assistant Surgeon Josiah Simpson
7th Infantry	Assistant Surgeon Chas. H. Laub
8th Infantry	Assistant Surgeon D. C. DeLeon
1st Pennsylvania Regiment	Surgeon John C. Reynolds
2nd Pennsylvania Regiment	Surgeon R. McMillan
1st South Carolina Regiment	Surgeon C. J. Clark
2nd New York Regiment	Surgeon Mina B. Halstead
3rd Illinois	
4th Illinois	
1st Tennessee	
2nd Tennessee	
Georgia Regiment	
Alabama Regiment	

MEDICAL OFFICERS WITH THE ARMY, FROM PUEBLA TO CITY OF MEXICO

Worth's Division

Medical Director, Surgeon Richard S. Satterlee, U. S. Army.
- First Brigade, Col. John Garland, U. S. A.
  - 2nd Artillery, Assistant Surgeon C. P. Deyerle, U. S. A.
  - 3rd Artillery, Assistant Surgeon L. H. Holden, U. S. A.
  - 4th Infantry, Assistant Surgeon James Simons, U. S. A.
- Second Brigade, Col. N. S. Clarke, U. S. A.
  - 5th Infantry, Assistant Surgeon Wm. Roberts, U. S. A.
  - 6th Infantry, Assistant Surgeon J. Simpson, U. S. A.
  - 8th Infantry, Assistant Surgeon D. C. DeLeon, U. S. A.

Twigg's Division

Medical Director, Surgeon Chas. Tripler, U. S. A.
- With Staff, Surgeon B. F. Harney, U. S. A.
- 1st Brigade, Brig. Gen. P. F. Smith, U. S. A.
  - Mounted Rifles, Assistant Surgeon A. F. Suter, U. S. A. (died Dec. 1847).
  - 1st Artillery, Assistant Surgeon H. H. Steiner, U. S. A.
  - 3rd Infantry, Assistant Surgeon C. C. Keeney, U. S. A.
- 2nd Brigade, Col. B. Reiley, U. S. A.
  - 2nd Infantry, Assistant Surgeon J. F. Hammond, U. S. A.
  - 4th Artillery, Surgeon J. M. Cuyler, U. S. A.
  - 7th Infantry, Surgeon B. Randall, U. S. A.
  - Taylor's Battery, Assistant Surgeon J. T. Head, U. S. A.

Cavalry Brigade, Provisional, Colonel Wm. S. Harney, U. S. A.
- 1st Dragoons (part of), Surgeon E. Swift, U. S. A.
- 2nd Dragoons (6 companies), Assistant Surgeon J. K. Barnes, U. S. A.
- 3rd Dragoons, Surgeon Edward H. Barton, U. S. A.
- Texas Horse, Surgeon A. Parker, U. S. V.

Pillow's Division—New Regulars

First Brigade, Brig. Gen. Franklin Pierce, U. S. V.
- 9th Infantry, Assistant Surgeon Francis L. Wheaton, U. S. A.
- 12th Infantry, Surgeon Robert H. Ritchie, U. S. A.
- 15th Infantry, Surgeon James B. Slade, U. S. A.; Assistant Surgeon R. Hagan, U. S. A.

Second Brigade, Brig. Gen. Geo. Cadwalader, U. S. V.
- Voltigeur Regt., Surgeon John W. Tyler, U. S. A.
- 11th Infantry, Surgeon Wm. J. Barry, U. S. A.; Assistant Surgeon Samuel D. Scott, U. S. A.
- 14th Infantry, Surgeon Lewis W. Jordan, U. S. A.
- Magruder's Battery, Assistant Surgeon J. M. Steiner, U. S. A.

REPORT OF A CASE OF ACUTE DIVERTICULITIS

By Major DUNLAP P. PENHALLOW
Medical Corps, United States Army

(With three illustrations)

THE following case of acute diverticulitis is reported as a matter of surgical interest.

The patient, a soldier in the O. R. D. at Camp Meade, 23 years of age, was admitted to the Camp Hospital on November 28, 1919, with the following history:

F. H.: Negative.

P. H.: Always well, but has had for several years occasional pains in abdomen, usually of short duration. These pains were especially noticeable after exertion.

P. I.: On the day of admission was seized with sudden and severe pains in abdomen which felt "puffed up." Pains were cramp-like in nature, occurring every three to four minutes, and were associated with a profuse and frequent diarrhea, bowels moving six times during the morning. Reported to his regimental infirmary and was given some medicine which checked the diarrhea. The pain, however, persisted and apparently became worse and for this reason the soldier was sent to the hospital. Just previous to admission patient vomited.

Examination on Admission: Patient, a rather slight man, looks sick and is apparently in great pain. Temperature 98.0. Pulse 74. General physical examination negative save for abdomen.

Abdomen: Whole of abdomen is tender, especially in the region of the umbilicus and in right upper quadrant. There is also some slight spasm and rigidity of the muscles on the right side. No distention, no masses, and no free fluid made out.

Urine: Specific gravity 1030. Reaction acid. Sugar negative. Albumin large amount. Sediment negative save for large amount of calcium oxalate crystals.

At this time a tentative diagnosis of fermentative diarrhea was made and the patient was given colon irrigation.

November 29, 1919.—Condition remained practically the same during the whole day. Pains in abdomen persistent and severe, requiring the use of opiates. Condition of abdomen practically unchanged, but patient looks much more sick than at entrance. Temperature 99.0. Pulse 70. W. B. C. 24,000.

10 p. m.: Condition slightly worse, appears to be suffering a great deal of pain. Facies typical of a peritoneal involvement. Abdomen now somewhat distended and shows signs of free fluid. Rigidity of abdominal muscles practically the same as at last note and the tenderness is more diffuse. About 9 p. m. vomited a large amount of liquid fecal matter. Temperature 97.8. Pulse 80.

Operation.—Mid-line incision below umbilicus. When peritoneum was opened a considerable amount of clear serous fluid escaped. This fluid proved later, on bacteriological examination, to be sterile. Intestines in lower portion of abdomen distended and injected. Appendix examined, found normal and removed. Further exploration of the abdominal cavity disclosed what at first appeared to be a volvulus which was acting as a constricting band and causing partial obstruction of the intestines. Further exploration, however, showed that this band was a diverticulum emanating from the ileum, about 12 inches from the ileo-cecal valve, extending

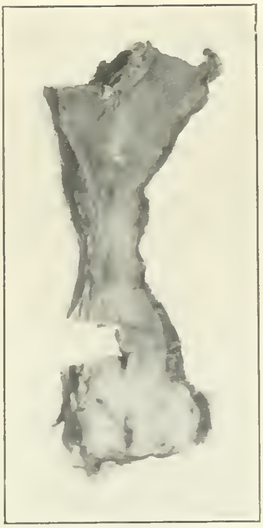


Fig. 1.

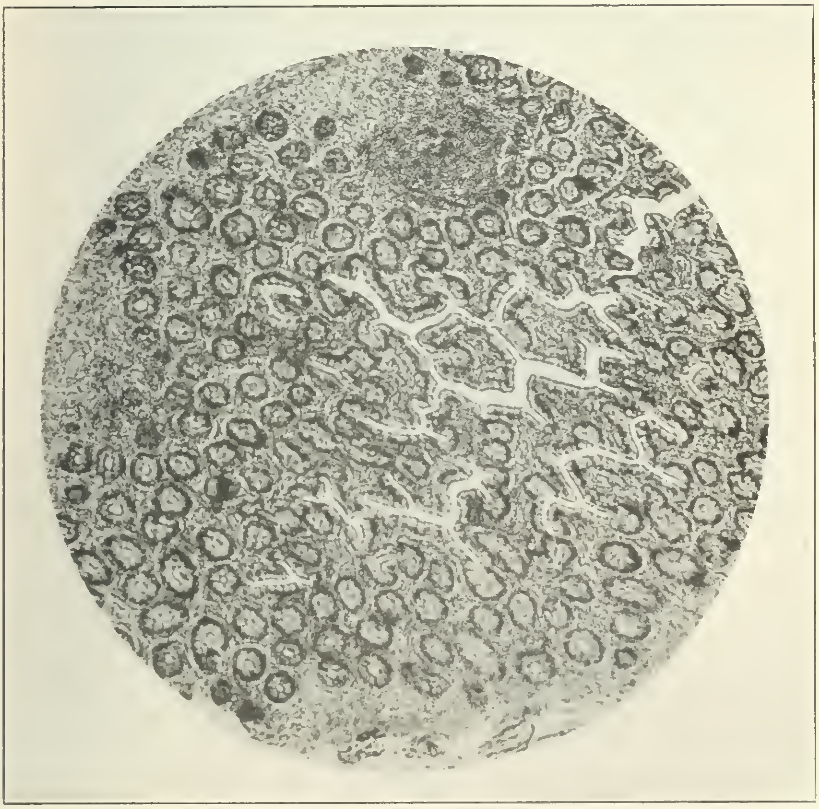


Fig. 2.

(To face page 610.)

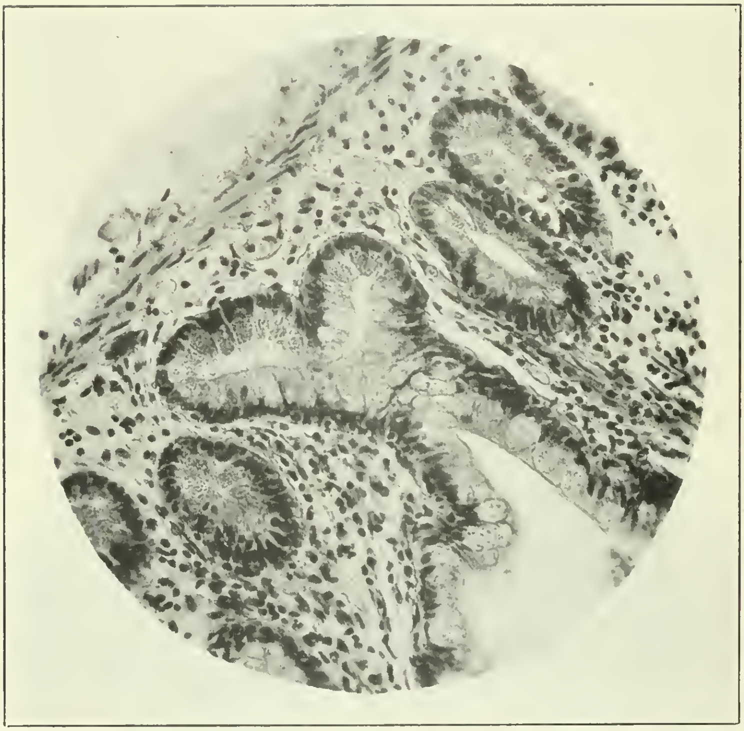


Fig. 3.

upward over several coils of the small intestine to the umbilicus, at which point it became bulbous and was attached to the peritoneum by a firm fibrous band. Partial obstruction of the underlying intestines was being caused by this diverticulum, which was extremely congested, especially in the upper third.

Diverticulum clamped at its junction with the intestine and removed. Stump ligated and invaginated and serous coat sutured over the invagination. Umbilical end ligated and diverticulum removed. Wound closed in layers with cigarette drain to pelvis.

Pathological Report on Specimen.—An intestinal diverticulum 9 cm. long and 1 cm. at its greatest diameter with bulbous extremity. (Fig. 1.) The middle half shows marked narrowing and a firmer consistency than the rest.

Externally it shows extreme congestion, deepening to a purple hue towards the distal end.

Upon opening, the mucous membrane appears somewhat thickened and injected, but there is no evidence of ulceration and no pus is present. The lumen is constricted throughout the middle half and distally opens into a lateral pouch-like expansion through an orifice 0.1 cm. in diameter. This expansion is about 0.5 cm. deep and contains a mucoid secretion.

Histological Description.—Section from the base of the diverticulum shows the usual intestinal layers of muscle with a marked dilatation of all blood vessels and some hemorrhage and leucocytic reaction. There is a deposit of fibrin on the serosa. The epithelium is columnar in type, goblet cells occurring about one in four. The crypt of Lieberkuhn branch freely and many of the lower ones contain a large percentage of the cells of Paneth, whose marked granulation takes the eosin stain very strongly. A mid-section does not differ from the proximal one except for a slightly more intense inflammatory reaction. The low-power photomicrograph 60 diameters (Fig. 2) shows the general distribution of the glandular epithelium. The high-power 325 diameters (Fig. 3) shows the eosinophilic granules in the cells of Paneth as a fine black stippling; goblet cells are clearly defined and also show a granular cytoplasm.

Following the operation patient has presented an uneventful convalescence. Drain was removed in 48 hours and wound was entirely healed in two weeks. There have been no further abdominal symptoms and patient is now, four weeks after operation, ready to be returned to duty.

Note.—The pathological report on this case was made by Lieut. F. W. Hachel, Medical Corps, at Camp Hospital, Camp Meade, and the histological report was made by Maj. James F. Coupal, Medical Corps, Army Medical Museum, at which place the photographs were also prepared.

EDITORIAL

AN ADVANCE IN EFFICIENCY AND FRATERNITY

The late, or present, war, whichever way you choose to look at it in the light of the cessation of hostilities with no peace, has taught us of the medical profession a number of things. Both those of us who wear the livery of the services, and our brothers who transact their duties in sack suits of colors varying in accordance with individual taste. We have claimed, ever since we have been issuing unassailable dictums from the editorial perch that this has been good medicine for both of us; for those of us who specialize in Government work and for the many more of us who find the fields of civil practice more attractive.

The mobilization of man power for national defence taught us two truths anyhow. First that in operations of any magnitude the regular personnel must be very materially augmented by draft of civil practitioners and second that more systematic and less sketchy organization is essential for the instruction of the men who are to shift from a strictly professional life to one which is interwoven with administrative detail and specialties. In the Medical Reserve Corps we had a start along this line, but even with it the course of instruction was not so thorough as to guarantee the rapid amalgamation of the two elements for practical working. It was a beginning: more than that, an advance, as has been stated in the article on the Medical Cadet Corps published elsewhere in this number.

Advances of this sort grow by the demonstration of the inefficiency of the existing system. The Medical Cadet Corps was to supply a deficiency: the inauguration of the Reserve Corps by Surgeon General O'Reilly, of the Army (himself a one-time medical cadet), was a step further on the road, and the intensive training of the civilian personnel of our country during our period in the World War, a recognition that not enough had yet been done to reach the degree of efficiency which was desirable in this most important phase of modern warfare.

With these lessons before them, those who drafted the Army Reorganization Act of June 4, 1920, wrote into it that which shall still further advance us in the event that we have to abandon again the plowshare for the sword.

Under the Reorganization Act medical units of the Reserve Officers' Training Corps are to be established at ten Class A medical schools having an enrollment sufficient to make possible the voluntary enrollment of fifty male students at the beginning of the freshman year. For the carrying on of this instructional work there is to be detailed an officer of the regular Army Medical Corps with the title of Professor of Military Science and Tactics. Ninety hours a year of theoretical instruction are contemplated in the course and it will cover the four years of the course. In addition to this didactic instruction there is provided at the end of the freshman year a six weeks' summer camp for practical instruction in field duties together with lectures. At the end of sophomore year there will be selected from these military students all who are eligible to continue the course for the remaining two years. These accepted students will receive during the junior and senior years $16 a month and further, during the six weeks summer instruction following the junior year, travel expense, board, quarters, medical attendance and $30 a month. Those who satisfactorily complete the course are eligible for commission in the Reserve Corps.

The course as laid out in detail is as follows:

Reserve Officers' Training Corps Units in Medical Schools

The Army Reorganization Act of June 4, 1920, provides satisfactory conditions for the establishment of medical corps units of the Reserve Officers' Training Corps in medical schools. The medical corps units are to be established in ten Class A medical schools with a sufficient enrollment to meet the requirements of the present law, which stipulates that fifty physically fit male students shall enroll for the course immediately on entering their freshman year. To each of these medical schools a medical officer of the Army will be assigned as professor of military science and tactics. The course will consist of:

1. Theoretic instruction, covering ninety hours per annum, or a total of 360 hours, consisting of lectures and textbook studies in hygiene, sanitation and first aid, customs of the service, including history of the Regular Army, organization, military law, equipment of the soldier, etc.
2. Practical drill and field duties for six weeks, to be given at summer camps following the freshman year. Attendance at this course is voluntary. The student will live under field conditions, and will receive instruction in discipline, character and military bearing, the hygiene and preparation of food and the care of military camps, including the disposal of waste, detection and destruction of mosquitoes and flies, etc.
3. An advance practical course of six weeks in drill and field duties following the junior year based on the training previously obtained.

A detailed statement in regard to the courses of instruction and other essentials has been sent to the officers of all Class A medical schools.

It would seem thus that we have an advance in efficiency by this method of systematic instruction covering the four years of the medical school course and with it an advance in fraternity as well; a marriage of the civil and the military function. That one may go to medical school and be instructed in that which pertains to the specialty of military medicine in the same matter-of-fact way in which he assimilates his anatomy, materia medica and the other essentials surely ought to rob this branch of the air of suspicious occultism which has led many physicians to believe that it is a mystery carefully guarded from the eyes of any save those who wear a uniform and insignia on their collars, shoulders or sleeves. It is certainly bound to be productive of results in the matter of developing men trained to a point where they may take up war-time duties with greater ease and efficiency than under former—or existing conditions—and it has the merit of being thoroughly democratic in that it places the acquisition of this knowledge at the disposal of any man who decides to make medicine a career.

It should certainly serve a double useful purpose, that of adding to the measure of our national preparedness and of bringing into closer and more sympathetic understanding the men who are permanently in uniform and those who may be called into it at any time.

James Robb Church.

* * *

ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, October 1, the following names were proposed and elected to membership in The Association:

Medical Corps, U. S. Army

Major

John Albert Sullivan

First Lieutenants

Athur F. Grove
Joe Harold St. John

Medical Reserve Corps, U. S. Army

Lieutenant Colonels

Stanley Francis Berry
Douglas Brown
Herbert C. Clark
Jacob Crum Epler
John Oliver McReynolds

Majors

Walter G. Bain
Leon George Brackett
William Walter Coleman
Bernard P. Conway
Francis Stevens Cook
James Elmore Cooke
Gilbert Geoffrey Cottam
Edmund Turner Douglas
R. Horatio Earle
Arthur McDonald Freels
John Henry George
Kenneth Earl Shaweker

First Lieutenants

Steven J. Conway
William Stickney

Medical Corps, U. S. Navy

Lieutenant

Charles Henry Savage

United States Public Health Service

Surgeon

A. J. Campbell

Assistant Surgeon

Franklin Adair Tyler

First Lieutenant, Medical Corps, Kansas National Guard

Henry E. Haskins

Major, Medical Corps, Maine National Guard

Joseph H. Murphy

First Lieutenant, Medical Corps, New York National Guard

Joseph Angelo Devlin

Associate Member

Capt. Lester F. Kishler, Dental Corps, Ohio National Guard

COMMENT AND CRITICISM

DERMATITIS EXFOLIATIVA

(With one illustration)

OFFICE OF DISTRICT BOARD OF HEALTH OF HAMILTON COUNTY GENERAL HEALTH DISTRICT

CINCINNATI, OHIO, *September* 29, 1920.

EDITOR, THE MILITARY SURGEON,
Army Medical Museum, Washington, D. C.

DEAR SIR: I note with much interest the cases of dermatitis exfoliativa reported by Lieut. Jules Magnette on page 342 of the September issue of THE MILITARY SURGEON.

For your information and that of those interested I wish to add another case to those reported. This case, as shown in the accompanying photograph, was treated at Camp Hospital No. 4, Joinville-le-Pont, at Paris. A complete report of this case can be found in the records of the hospital, and the following data are given entirely from memory.

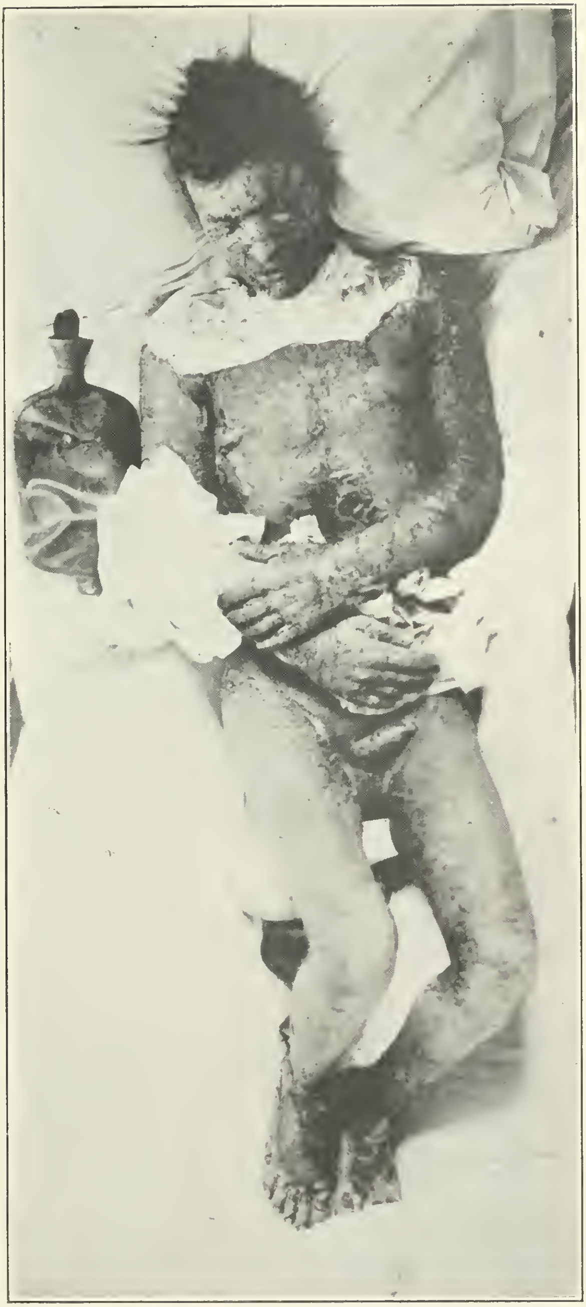
The patient, named ———, was about 25 years of age and was admitted to the hospital for secondary syphilis. The family history and general condition other than the cause of admission was negative. The patient was treated by routine methods as prescribed by the chief surgeon office, A. E. F. Desquamation followed the second injection and developed rapidly, covering the entire body. The patient "scaled" four times, including the loss of finger and toe nails. About the fourth week he developed pneumonia, but made a complete recovery.

There was no other pathological condition than pneumonia and the skin condition except that traces of albumen were found in the urine. Unlike the cases reported by Lieutenant Magnette, this case on recovery showed a double plus Wasserman.

Routine examination of all cases for albumen were made in the hospital after this occurred, and no cases showing traces of albumen were given arsenic. No other cases occurred at this hospital.

Yours very truly,

C. ALESHIRE NEAL,
(*Late*) *Lieutenant Colonel, Medical Corps.*



(To face page 616.)

BOOK REVIEWS

The Maintenance of Peace, by Lieut. Col. S. C. Vestal, Coast Artillery Corps. New York: G. P. Putnam's Sons, 1920. Price, $5.00

This book is a study of the factors that disturb domestic and international peace. The author very clearly shows how international peace may be preserved by the power of the majority of mankind as domestic peace is preserved by the power of the majority in a nation.

In Chapters I and II the subject is divided into two branches, namely, the maintenance of domestic peace within nations or states and the maintenance of peace between nations or states. In Chapter II the principles involved in the maintenance of domestic peace are discussed; and Chapters III and IV show how these principles have operated in the Latin American States and in the United States.

The rest of the volume is devoted to the subject of international peace.

The chapter on "The Effect of Climate on the Formation of Races" is especially well written, and in it the author reaches the following conclusion: "Every nation has the right to preserve the racial purity of its people and to protect them against economic competition on its own soil by limiting or restricting immigration or by prohibiting it altogether; and that no state has a just complaint when its people are denied the privilege of settling within the jurisdiction of another state."

No one can read this work without being impressed with the author's knowledge of the world's history and his thorough understanding of the subject treated. The book is well written and comprises 584 pages.

George Miller Sternberg; A Biography. By his wife, Martha L. Sternberg. Cloth. Price, $5.00. Pp. 232, with illustrations. Chicago: American Medical Association, 1920.

Doctor Sternberg entered the Army in 1861 as surgeon with the Union forces, and served throughout the Civil War and in the Indian campaigns, notably the Nez Perces War, a vivid account of which is rendered in his biography. In the course of his tours of duty at eastern and southern military posts, he acquired valuable experience in combating cholera and yellow fever, and his expert advice was frequently in request when these diseases threatened to invade the country in epidemic form. He was the pioneer in bacteriology in the United States; he discovered the pneumococcus in 1880, and was the first in this country to demonstrate the organisms of malaria, cholera, and tuberculosis. The practice of modern disinfection is based on Dr. Sternberg's researches on the value of commercial disinfectants, which work he started in 1878 at an isolated frontier army post. Under the same inauspicious surroundings he also invented a heat regulator, modified and elaborated forms of which are today in general use for the thermostatic control of heating apparatus.

As Surgeon General he directed the medical activities of the army during the Spanish-American War, founded the Army Medical School, organized the Nurse Corps and the Dental Corps, and established many military hospitals throughout the United States, including the Tuberculosis Hospital at Fort Bayard. By the establishment of laboratories and by personal encouragement he inspired medical officers of the Army to engage in research to the development of which he has spent the best years of his life. Many scientific investigations were conducted during his term as Surgeon General, the most important of which related to tropical diseases, typhoid fever and yellow fever. During the Spanish-American War he recommended the appointment of the Typhoid Fever Board composed of Majors Walter Reed, Victor C. Vaughan and Edward O. Shakespeare, and suggested the searching investigation of typhoid fever in the military camps which led to the formulation of adequate measures of prevention.

From his first experience with yellow fever at Governors Island, New York Harbor, Dr. Sternberg's interest in the subject never flagged. He fought several epidemics of the disease in the cities and military posts along our coast and himself suffered a severe attack of the disease. He was a member of the first Havana Yellow Fever Commission, the appointment of which was the immediate outcome of the wide prevalence and great mortality of yellow fever in 1878, and he made exhaustive studies of the disease in Cuba, Mexico, Brazil and other tropical countries. One of the most brilliant discoveries in the history of medicine resulted from his appointment of the Yellow Fever Board, under Maj. Walter Reed, in May, 1900, which by human experimentation proved conclusively that yellow fever is transmitted by mosquitoes. The practical application of this discovery resulted in the eradication of yellow fever from Havana and contributed to the successful building of the Panama Canal. After his retirement from the Army, he did much to improve housing conditions among the laboring classes in Washington, and toward the prevention of tuberculosis. He was the author of a manual of bacteriology and of several other works on special topics, notably on malaria, immunity, serum therapy, and infection. He had been highly honored during his lifetime, and was president of the American Medical Association and of many other scientific societies.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

A Practical Treatise on Artificial Crown, Bridge and Porcelain Work, by George Evans, D.D.S., F.A.A.D.S. Eighth edition, revised and enlarged, with 1143 illustrations. Philadelphia: P. Blakiston's Son & Company.

The Lethal War Gases. Physiology and Experimental Treatment, by Frank B. Underhill. Yale University Press, 1920. New Haven, Conn.

Obituary

Those of our membership whose deaths have been noted since our last report are as follows:

Major Francis J. Adams, M. R. C., U. S. Army.
Colonel Isadore Dyer, M. R. C., U. S. Army.
Major Charles D. Ricker, M. R. C., U. S. Army.
Capt. Charles P. Roach, M. R. C., U. S. Army.
Capt. French A. Smith, M. R. C., U. S. Army.
Dr. J. H. Willard.

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THE
MILITARY SURGEON

VOL. XLVII DECEMBER, 1920 NUMBER 6

ELEMENTARY CHEMICAL AND BACTERIOLOGICAL ASPECTS OF THE TRUE REACTION OF CULTURE MEDIA[1]

BY CAPTAIN WESLEY C. COX, A. B., M. D. AND MAJOR CYRUS B. WOOD, B. S., M. D.

Medical Corps, United States Army

(With nine illustrations)

WITHIN recent years the determination of the true reaction of solutions has been developed from the stage of a physical chemistry problem to the point where it is practical in a modestly equipped laboratory, and the advantages of determining this property of solutions are available in routine laboratory work.

The thorough understanding of this subject is essential for the laboratory worker of today, and an acquaintance with it is desirable on the part of the physicians caring for the patients who are the source of specimens submitted to the laboratory for examination. In our experience, the principal reason for the difficulty in comprehending the subject is that the average physician received a more or less thorough course of instruction in chemistry in the dim and distant past, and the facts learned at that time are not easy to recall. The attempt is made here to develop the subject briefly, introducing experiments which have been found of value (and which we hope the readers will make an effort to perform), and then turning to practical phases of the determination of the true reaction of complex solutions.

About a century and a half ago the element oxygen was discovered, and was so named because its presence was promptly established in many of the compounds known at that time which possessed acid properties. In time other compounds were carefully analysed, and several of undoubted acid properties were found to contain no oxygen. Finally it was established that the essential chemical characteristic of all acids is the element *hydrogen*, not oxygen, and, furthermore, *hydrogen of the kind that can be replaced by a metal or basic radical.*

---

[1] From the Division of Laboratories, Army Medical School; published by permission of the Surgeon General.

The proof of the formation of salts by the neutralization of acids with bases followed, and analysis proved that the essential chemical characteristic of bases is the hydroxyl group, and that the phenomenon of neutralization is always accompanied by the formation of water in addition to the salt.

For over a generation the chemical law of Definite Proportions has been applied in the use of solutions of definite strength or concentration for the analysis of unknown solutions; volumetric analysis, as this form of quantitative analysis is known, by neutralization, oxidation-reduction and precipitation reactions is familiar to all of our readers. It is important to emphasize, however, the unit chosen for these standard volumetric solutions. For the reaction involved, one liter of a solution containing one gram-atomic weight of *replaceable* hydrogen, or its equivalent, is said to be of Normal strength or concentration (this latter term is the more exact, and will be used). This concentration is abbreviated by the letter N, and solutions of other than Normal concentration are designated by the letter N influenced by a fraction or decimal.

For example, hydrochloric acid is chemically HCl; its molecular weight is the sum of its atomic weights—H = 1.008, Cl = 35.46, HCl = 36.468. A Normal solution contains 36.468 grams of HCl per liter; a tenth-normal solution, which is designated by the expressions $\frac{1}{10}$N, $\frac{N}{10}$ or 0.1 N, contains 3.6468 grams of HCl per liter. Sulphuric acid is chemically H_2SO_4; *both* of its hydrogen atoms are replaceable by a metal, therefore a Normal solution contains *one-half* of its gram-molecular weight per liter; H = 1.008, S = 32.06, O = 16, $H_2SO_4 = 2.016 + 32.06 + 64 = 98.076$, $\frac{98.076}{2} = 49.038$ = grams of H_2SO_4 per liter of Normal solution. Acetic acid, $HC_2H_3O_2$, contains in its molecule four atoms of hydrogen, but *only one* of them is replaceable by a metal, hence a Normal solution of this acid contains one gram-molecular weight per liter. Similarly with the bases; Normal solutions contain per liter one gram-molecular weight divided by the number of hydroxyl groups in the molecule.

For some purposes it is desirable to work with solutions containing equivalent numbers of molecules of various compounds, without regard to their relation to replaceable hydrogen. In this case, the unit of concentration has been chosen as one gram-molecular weight per liter; such solutions are said to be of "molecular" concentration, which term is usually shortened to "molar." Molar concentration is indicated by the letter M, and multiples or fractions of this concentration are designated as in the case of Normal solutions. A molar solution of HCl and of $HC_2H_3O_2$ is, obviously, synonymous with a Normal; a molar solution of H_2SO_4, however, is twice Normal concentration, or 2 N.

[To avoid confusion with physiologically normal salt solution, we feel that the effort should be made to capitalize the term referring to chemically Normal solutions at all times.]

Raoult's Laws announced the discovery of the facts that the freezing and boiling points of solvents are characteristically lowered and raised, respectively, by equivalent quantities—*i.e.*, equal numbers of molecules—of many different solutes, provided only that the solutions be dilute. There is a large class of chemical compounds, however, that behave atypically in these respects, in that they cause greater changes in the freezing and boiling points of their solutions than would be expected. These variations, provided the solutions be dilute, are not irregular or erratic; the changes observed in solutions of the members of this class of compounds differ from the typical ones in being small whole multiples of them. The freezing point of molar solutions of cane sugar, methyl alcohol and glycerine are all -1.87°C., but a molar solution of sodium chloride freezes at -3.6°C.—almost twice the previous figure. Equivalent solutions of sodium sulphate, potassium ferricyanide and potassium ferrocyanide have freezing points respectively three, four and five times the above figure, approximately.

Similarly with the boiling points; the compounds just mentioned raise the boiling points of solvents nearly two, three, four and five times as much as do equivalent solutions of sugar and glycerine.

In addition to their being atypical in freezing and boiling points, solutions of this class of compounds have atypical osmotic pressures, and, most striking of all differences, they contribute to their aqueous solutions the property of conducting an electric current. Pure water offers tremendous resistance to the passage of an electric current. It is estimated that a layer of pure water one millimeter thick offers as much resistance to an electric current as a copper wire of the same diameter forty million kilometers in length—long enough to encircle the earth at the equator one thousand times. Cane sugar, methyl alcohol, glycerine and other compounds whose solutions obey Raoult's Laws, do not confer on water any increased ability to conduct an electric current, but sodium chloride and the other salts mentioned above, and acids, bases and salts in general do give to water the ability to transmit an electric current very readily. Such compounds are known as electrolytes, and those whose solutions do not transmit an electric current readily are called non-electrolytes.

In 1887 Arrhenius offered the Ionic Theory to explain these apparently discordant facts. Since that date much has been done in the fields of chemistry and physics, and all the discoveries have tended to substantiate this theory. The evidence is still, strictly speaking, circumstantial; the final proof is still wanting, but the theory has nevertheless been universally accepted.

Briefly, the Ionic Theory proposes that, on going into solution, the molecules of an electrolyte break up or dissociate into two or more portions, these portions being positively and negatively charged electrically, the positively charged portions being different chemically than those negatively charged. When an electric current is passed through the solution of an electrolyte the positively charged portions are attracted by the negative pole or electrode, and move toward it; the negatively charged portions are attracted by, and migrate toward the positive electrode. From this property of moving toward one of the electrodes, these charged molecular fractions of electrolytes are called ions, from the Greek verb meaning "to move."

Experiment A.—Prepare 75–100 c.c. of a 4 or 5 per cent solution of agar in a 10 per cent potassium chloride solution. Add 1 c.c. of U.S.P. phenolphthalein test solution and sufficient potassium hydroxide solution to develop a permanent red color. Divide into two portions, and add to one just sufficient hydrochloric acid to discharge the red color. Pour these solutions simultaneously into both arms of a U-tube of about 15 mm. diameter, which is cooled from the outside by immersion in a beaker of ice water. Allow to harden.

Overlay the red agar with a few c.c. of a 10 per cent solution of potassium chloride which has been colored a distinct blue with copper sulphate, and made slightly acid with hydrochloric acid. Over the colorless agar place a few c.c. of a 10 per cent potassium chloride solution made slightly alkaline with potassium hydroxide.

Wire two or three dry cells (giving about 4 volts) in series; place the cathode (from the zinc) in the solution over the colorless agar, and the anode (from the carbon) above the red agar. The copper wire ends will serve satisfactorily as electrodes. Let the current pass for 20 to 30 minutes.

The surface of the red agar in contact with the acidified solution above it will be decolorized, and the surface of the colorless agar will be colored by contact with the alkaline solution above it; the passage of the current will result, however, in these changes in color extending to appreciable depth into the agar, the depths increasing with the period of passing the current.

After the red agar has been decolorized to a depth of 1.5 to 2 cm., remove the wires, discard the solutions and observe the agar column in each arm carefully. Notice the sharp horizontal border between the colorless and red portions in each arm, the slight bluish tint extending very little below the surface in the arm that held the acidified potassium chloride-copper sulphate solution, and the relative depths to which the red arm has been decolorized and the colorless arm reddened.

The experiment is explained by the Ionic Theory as follows: the positively charged hydrogen ions, from the hydrochloric acid of the solution above the red agar, are attracted by the cathode in the solution above the colorless agar, and move toward it, marking their progress by discharging the red color of the agar which they are traveling through. Likewise, the hydroxyl ions, negatively charged, are attracted by the anode in the solution in the opposite arm, and in migrating toward it redden the colorless agar they meet. The bluish tint to the agar that has been decolorized by the hydrogen ions is due to the colored copper ions, which move much more slowly than the hydrogen ions. The fact that the hydrogen ions move much faster than the hydroxyl ions is indicated by the greater depth to which the red agar has been decolorized, than the depth to which the colorless agar has been reddened. [This fact can be shown better, if a U tube of narrower diameter is used. The hydrogen and hydroxyl groups move most rapidly, of all ions.]

The formulae of the salts mentioned above, in connection with Raoult's Laws, can be written in the following manner to indicate their dissociation; the positive ions are indicated by the mark (·), the negative by (′), the valence of the individual ions by the number of those marks effecting them, and the small whole multiples by which solutions of these salts depart from Raoult's Laws, by the total number of ions, regardless of their individual valences:

Sodium chloride	$NaCl$	$= Na^{\cdot}, Cl'$	[2]
Sodium sulphate	Na_2SO_4	$= Na^{\cdot}, Na^{\cdot}, (SO_4)''$	[3]
Potassium ferricyanide	$K_3Fe(CN)_6$	$= K^{\cdot}, K^{\cdot}, K^{\cdot}, (Fe(CN)_6)'''$	[4]
Potassium ferrocyanide	$K_4Fe(CN)_6$	$= K^{\cdot}, K^{\cdot}, K^{\cdot}, K^{\cdot}, (Fe(CN)_6)''''$	[5]

It would be more correct to write the dissociation equations for sodium chloride and for all other electrolytes in this manner, $NaCl(xH_2O) = Na\cdot(xH_2O) + Cl'(xH_2O)$, to express our belief that the undissociated molecules and the ions of electrolytes are in some kind of chemical combination with an indefinite number of molecules of the solvent, when in solution. These subscripts are understood at all times, and are omitted by common consent.

We are interested in aqueous solutions especially, in all except special work of certain kinds, and unless otherwise specified water will be understood to be the solvent in what follows. Solutes ionize also in other solvents; ionization is most marked in water and less marked, in decreasing degrees, in the solvents methyl alcohol, ethyl alcohol, chloroform, carbon disulphide, benzene, ether, liquid ammonia and liquid hydrogen cyanide. Many salts are appreciably ionized when fused.

In studying the chemical formulae of compounds in the light of the Ionic Theory, we can extend our definitions of acids, bases and acid, basic and neutral salts, and it is very desirable to learn to think of them in the following manner:

1. ACIDS are electrolytes which yield in solution two kinds of ions (as do all electrolytes), oppositely charged electrically, the *positively charged ions being hydrogen ions* (H.).
2. BASES yield in solutions two kinds of ions, their *negatively charged ions being hydroxyl ions* (OH.).
3. NEUTRAL SALTS yield in solution positive and negative ions, the positive being *different from hydrogen ions,* the negative *different from hydroxyl ions.*
4. ACID SALTS dissociate into positive and negative ions, the *positive* being of *two* kinds, *one of which is hydrogen ions.*
5. BASIC SALTS dissociate into positive and negative ions, the *negative* being of *two* kinds, *one of which is hydroxyl ions.*

	Uni-univalent	Uni-bivalent Bi-univalent	Bi-bivalent	Uni-trivalent Tri-univalent	Bi-trivalent
Acids.......	$\mathrm{H^{\cdot}Cl'}$	$\mathrm{H^{\cdot}{}_2(SO_4)''}$	....	$\mathrm{H^{\cdot}{}_3(PO_4)'''}$	
Bases.......	$\mathrm{Na^{\cdot}(OH)'}$	$\mathrm{Ca^{\cdot\cdot}(OH)'_2}$	....	$\mathrm{Bi^{\cdot\cdot\cdot}(OH)'_3}$	
Neutral salts	$\mathrm{Na^{\cdot}Cl'}$	$\mathrm{Na._2(SO_4)''}$	$\mathrm{Ca^{\cdot\cdot}(SO_4)''}$	$\mathrm{Na^{\cdot}{}_3(PO_4)'''}$	$\mathrm{Ca^{\cdot\cdot}{}_3(PO_4)''_2}$
	....	$\mathrm{Ca^{\cdot\cdot}Cl'_2}$	....	$\mathrm{Bi^{\cdot\cdot\cdot}Cl'_3}$	
Acid salts...	*	$\mathrm{Na^{\cdot}H^{\cdot}(SO_4)}$	$\mathrm{Ca^{\cdot\cdot}(HSO_4)'_2}$	$\mathrm{Na^{\cdot}H^{\cdot}{}_2(PO_4)'''}$ $\mathrm{Na^{\cdot}{}_2H^{\cdot}(PO_4)'''}$	$\mathrm{Ca^{\cdot\cdot}H^{\cdot}(PO_4)'''}$
Basic salts..	*	$\mathrm{Ca..(OH)'Cl'}$	....	$\mathrm{Bi^{\cdot\cdot\cdot}(OH)'_2(NO_2)'}$	

* Acid and basic salts are obviously impossible in the case of salts formed by the combination of uni-univalent acids and bases.

The study of the electrical conductance of solutions of electrolytes has been very productive of advance in the knowledge of solutions in general. The physical chemist measures their conductance in cells with electrodes exactly 1 c.m. apart, and expresses the resistance of such solutions in terms of ohms, the conductance in terms of reciprocal ohms. As a unit, the term "equivalent conductance" has been chosen to express the conductance of that volume of a solution which contains one gram-molecular weight of the substance under investigation. The following table from Stieglitz for various dilutions of potassium chloride illustrates the general property of solutions of electrolytes, namely, that the equivalent conductance increases with the dilution. Infinite dilution, it is believed, means 100 per cent ionization, and until dilution is infinite, there is always a certain portion of the solute present in unionized condition. The ratio of the dissociated to the undissociated portions (last column) is an important one, and will be referred to later.

Molar concentration	Conductivity in reciprocal ohms	Per cent ionized	Equilibrium ratio, $[K^{\cdot}]$ x $[Cl']/[KCl]$
0.	131.2	100.	.....
0.001	127.6	97.3	0.035
0.01	122.5	93.4	0.130
0.05	115.9	88.4	0.335
0.10	111.9	85.1	0.485
0.20	107.7	82.1	0.754
0.50	102.3	77.9	1.38
1.00	98.2	74.9	2.23

The salts in general are strong electrolytes, ionizing to about 50 per cent or more in 0.1 molar concentration. The following table from Noyes gives the approximate values of the ionized portions of the different types of salts at this concentration:

		Per Cent
Uni-univalent	KCl	84
Uni-bivalent, bi-univalent	K_2SO_4, $BaCl_2$	73
Uni-trivalent, tri-univalent	$K_3Fe(CN)_6$, $AlCl_3$	65
Bi-bivalent	$MgSO_4$	40

Aside from the conductance method, the chemist is limited in determining accurately the degree of ionization of salts in various dilutions. It is different in the case of the acids and bases, however. Most acids invert cane sugar into glucose and fructose, and they have been studied and classified on the basis of this reaction. Bases as a class hydrolyse esters, such as ethyl acetate, and they have been investigated as to their comparative powers in this reaction. And the striking fact has been established, that these classifications agree with the classifications of acids and bases from conductance studies. The acids that most readily invert sugar are the ones with the higher conductance values; the bases with the larger equivalent conductances are the ones which hydrolyse esters most easily. There can be no mere coincidence about it—the conclusion is inevitable, that *the same factor which contributes to the conductance values of electrolytes in solution governs their strengths chemically. The strong acids and bases are chemically strong because they are ionized most completely; the weaker ones are only slightly ionized.* The salts, with a very few exceptions, and the chemically strong acids and bases are strong electrolytes; the chemically weak acids and bases, and a few salts, are weak electrolytes.

The weak electrolytes obey the laws of chemical equilibrium in that, in dilute solutions, the equilibrium ratio $\frac{\text{(concentration of cation)} \times \text{(concentration of anion)}}{\text{concentration of undissociated molecules}}$ equals a constant value, typical of each compound, and varying with the temperature. Strong electrolytes do not obey this law, as will be noticed by referring to the last column of the table for various potassium chloride solutions above. Just why this is true, cannot be answered definitely at present; one undoubted factor in the explanation is the solute-solvent complex referred to above.

A brief discussion of chemical equilibrium will find application to the later phases of our subject. The reader is urged at this point to consult the references given, and to perform himself some of the simpler experiments described under this subject; the more thorough comprehension resulting will be well worth while.

Acetic acid, $HC_2H_3O_2$, is a weak electrolyte, only slightly dissociated in all but very dilute solutions. Its dissociation is indicated by the equation $HC_2H_3O_2 \leftrightarrows H^{\cdot} + C_2H_3O_2'$, which tells us that some molecules of this compound ionize into positively charged hydrogen and negatively charged acetate ions. The double arrows state the reaction to be a reversible one; the tendency to dissociate and to re-unite are both constantly present, and proceed at equal rates when equilibrium has been established. These rates have been measured, and in this case the equilibrium ratio has been found to be 0.000018 in all dilute solutions, at 18°C. The following equation expresses all these facts, the inclosure of a chemical term in brackets signifying by common consent the concentration in gram-atomic or gram-molecular weights per liter: $\frac{[H^{\cdot}] \times [C_2H_3O_2']}{[HC_2H_3O_2]} = 0.000018$ (18°C.). In the case of all weak electrolytes, where the equilibrium ratio is a constant value, at constant temperature, in all dilute solutions, this value is known as the ionization constant: $\frac{\text{[cation]} \times \text{[anion]}}{\text{[unionized portion]}} = \text{K ionization } (X°\text{C.})$.

To use this equation, we will first substitute in it the ionization value of a certain concentration of acetic acid, and, later, calculate the degree of ionization in a different concentration. In 0.1 molar concentration acetic acid at 18°C. is only 1.34 per cent ionized; the equation describing it becomes $\frac{[H.] \times [C_2H_3O_2']}{[HC_2H_3O_2]} = \frac{(0.1 \times 0.0134) \times (0.1 \times 0.0134)}{0.1 \times (1 - 0.0134)} = \frac{(0.00134)^2}{0.09866} = \frac{0.0000017956}{0.09866} = 0.0000182$. This gives us a definite value for acetic acid which is comparable in every way with similar values for other weak electrolytes, and is also comparable to the equilibrium ratio values of identical concentrations of strong electrolytes. The following table from Stieglitz gives these values for a number of the common acids and bases in 0.1 molar concentrations.

THE IONIZATION CONSTANTS OF ACIDS AND BASES. (FROM STIEGLITZ)

(The values in parenthesis under K for the strong acids and bases are not true ionization constants, but are the equilibrium values for 0.1 molar solutions only; for the alkaline earths (Ba, Ca, Sr) they are the values for 0.05 molar solutions.)

Acid or base	Equilibrium ratio	K
Hydrochloric acid	$[H\cdot] \times [Cl']/[HCl]$	(1)
Hydrobromic acid	$[H\cdot] \times [Br']/[HBr]$	(1)
Hydriodic acid	$[H\cdot] \times [I']/[HI]$	(1)
Nitric acid	$[H\cdot] \times [NO_3']/[HNO_3]$	(1)
Chromic acid	$[H\cdot] \times [HCrO_4']/[H_2CrO_4]$	(1)
	$[H\cdot] \times [CrO_4'']/[HCrO_4']$	$0.0_{6}6$
Sulphuric acid	$[H\cdot] \times [HSO_4']/[H_2SO_4]$	(1)
	$[H\cdot] \times [SO_4'']/[HSO_4']$	0.03
Oxalic acid	$[H\cdot] \times [HC_2O_4']/[H_2C_2O_4]$	0.038
	$[H\cdot] \times [C_2O_4'']/[HC_2O_4']$	$0.0_{4}5$
Phosphoric acid	$[H\cdot] \times [H_2PO_4']/[H_3PO_4]$	0.01
	$[H\cdot] \times [HPO_4'']/[H_2PO_4']$	$0.0_{6}2$
	$[H\cdot] \times [PO_4''']/[HPO_4'']$	$0.0_{12}4$
Arsenic acid	$[H\cdot] \times [H_2AsO_4']/[H_3AsO_4]$	0.005
Nitrous acid	$[H\cdot] \times [NO_2']/[HNO_2]$	0.0005
Acetic acid	$[H\cdot] \times [C_2H_3O_2']/[HC_2H_3O_2]$	$0.0_{4}18$
Carbonic acid	$[H\cdot] \times [HCO_3']/[H_2CO_3]$	$0.0_{6}3$
	$[H\cdot] \times [CO_3'']/[HCO_3']$	$0.0_{10}7$
Hydrosulphuric acid	$[H\cdot] \times [HS']/[H_2S]$	$0.0_{7}9$
	$[H\cdot] \times [S'']/[HS']$	$0.0_{14}1$
Boric acid	$[H\cdot] \times [H_2BO_3']/[H_3BO_3]$	$0.0_{9}7$
Hydrocyanic acid	$[H\cdot] \times [CN']/[HCN]$	$0.0_{9}7$
Arsenious acid	$[H\cdot] \times [H_2AsO_3']/[H_3AsO_3]$	$0.0_{9}6$
Water	$[H\cdot] \times [OH']$ at 22°C.	$0.0_{13}1$
	at 25°C.	$0.0_{13}12$
	at 100°C.	$0.0_{11}5$
Potassium hydroxide	$[K\cdot] \times [OH']/[KOH]$	(1)
Sodium hydroxide	$[Na\cdot] \times [OH']/[NaOH]$	(1)
Barium hydroxide	$[Ba\cdot\cdot] \times [OH']^2/[Ba(OH)_2]$	(0.03)
Strontium hydroxide	$[Sr\cdot\cdot] \times [OH']^2/[Sr(OH)_2]$	(0.03)
Calcium hydroxide	$[Ca\cdot\cdot] \times [OH']^2/[Ca(OH)_2]$	(0.03)
Ammonium hydroxide	$[NH_4\cdot] \times [OH']/[NH_4OH] + [NH_3]$	$0.0_{4}18$
Hydrazine	$[N_2H_5\cdot] \times [OH']/[N_2H_5OH] + [N_2H_4]$	$0.0_{5}3$
Aniline	$[C_6H_5NH_3\cdot] \times [OH']/[C_6H_5NH_3OH] + [C_6H_5NH_2]$	$0.0_{9}5$

Notice that the polyvalent acids ionize in steps; the primary ionization, *i. e.*, the ionization of the first hydrogen, takes place more readily than the second, and if a third ionization is possible, it takes place at a much lower value even than the second; *e. g.*, phosphoric acid is a trivalent acid, and is a strong acid in respect to its first hydrogen only, the second hydrogen makes it a weak acid (much weaker than acetic acid, even), and the third hydrogen is so slightly ionized that it confers practically negligible acid properties upon its molecule. (The investigation of the polyvalent bases is rendered difficult by their slight solubility, but the indications are that they also ionize stepwise.)

To find the degree of ionization of another dilution of acetic acid, we simply use the above equation in the reverse manner. Let us take 0.01 molar acetic acid: if its degree of dissociation were still 1.34 per cent, the equation $\frac{(0.0134 \times 0.01)^2}{(0.9866 \times 0.01)} = 0.000018$ would be true, but it is not; the value is ten times smaller than the constant, or 0.00000182. Some change has taken place in the numerator, or in the denominator, or both, of this fraction. Since the denominator is very close to unity times the concentration, it can be considered for the time being as being equal to the concentration, and the numerator be examined. The two factors in the numerator must change, each being multiplied by approximately the square root of 10. Solving the equation gives

$$\frac{[H\cdot] \times [C_2H_3O_2']}{[HC_2H_3O_2]} = \frac{(0.01 \times 0.0417)^2}{0.009583} = 0.0000181.$$

In 0.01 molar concentration acetic acid is ionized to the extent of 4.17 per cent.

The consideration of further facts about acetic acid and one of its salts will be of value in later phases of our subject.

Experiment B.—In each of three 250 c.c. beakers or flasks place 100 c.c. of distilled water and four or five drops of U.S.P. methyl orange test solution; mark the flasks A, B and C. To A add just sufficient of a weak solution of acetic acid to develop a definite pink color. Add the same quantity to B. Now, to both B and C add a few small crystals of sodium acetate and stir. The pink color of B was discharged by the addition of the sodium acetate the resulting color being a yellow, as in C. Test the reaction of A, B and C with litmus paper. A and B will be found to turn blue litmus paper red, while C will be neutral or very slightly alkaline.

Methyl orange is one of the coloring matters used as an indicator in acidimetry and alkalimetry, as it has different colors in acid (pink) and alkaline (yellow) reaction. It is not a very sensitive indicator for the acids, however; in other words, it is not sensitive to very small concentrations of hydrogen ions. Litmus is much more sensitive to acids, showing by its red color a hydrogen ion concentration some 100 times smaller than is indicated by the pink color of methyl orange. The color changes observed above tell us, therefore, that the addition of sodium acetate to a solution of acetic acid reduces the hydrogen ion concentration of that solution below the sensitivity of methyl orange, but not below that of litmus. [The use of sodium acetate may be objected to on the grounds that it, being a salt of a strong base and weak acid, will tend to hydrolyse, its solution being alkaline in reaction. Under the conditions of the experiment the degree of hydrolysis is negligible, and cannot account for the decrease in degree of acidity of the acetic acid solution; furthermore, ammonium acetate will serve the purpose of the experiment just as well. Notice the ionization constants of ammonium hydroxide and acetic acid in the table given above.]

We can study this experiment quantitatively, with the aid of our equilibrium equation. Assuming the temperature throughout to be 18°C., let us suppose that a molar solution of acetic acid is taken, and sodium acetate is added until its concentration also is molar. Molar acetic acid is ionized only to 0.42 per cent, and is described by the equation $\frac{[H\cdot] \times [C_2H_3O_2']}{[HC_2H_3O_2]} = \frac{(1 \times 0.0042)^2}{1 \times 0.9958} = 0.000018$. Sodium acetate, in molar concentration, is ionized to the extent of 53 per cent. In a solution containing both acetic acid and one of its salts, we must, in calculating the degree of ionization of the acetic acid, take into account *all* of the acetate ions present; it makes no difference whether they were originally combined with hydrogen or sodium atoms. A solution molar in respect to both acetic acid and sodium acetate is not described by the equation $\frac{[H\cdot] \times [C_2H_3O_2']}{[HC_2H_3O_2]} = \frac{0.0042 \times (0.0042 + 0.53)}{0.9958}$, as its value is much greater than the constant. As in the problem above, a change has taken place in both the numerator and the denominator of this equation, and we can again consider the denominator as unity times the concentration temporarily, and examine the numerator. The acetate ion concentration has been increased $\frac{0.5342}{0.0042} = 127$ times its value in molar acetic acid; the hydrogen ion concentration has therefore been diminished to 127th of its value, remembering that acetic acid as a weak electrolyte in all dilute solutions has the ionization constant of 0.000018. A quadratic equation solves the above equation; the solution containing both acetic acid and sodium acetate in molar concentrations is described, in respect to the acetic acid, by the equilibrium ratio $\frac{[H\cdot] \times [C_2H_3O_2']}{[HC_2H_3O_2]} = \frac{0.000034 \times 0.530034}{0.999966} = 0.000018$. Notice the small value of the hydrogen ions; this represents the number of gram-atomic weights of hydrogen in the ionized state, per liter. The solution is very weakly acid indeed.

This illustrates the influence of the salts of all weak acids upon their acids; such acids are greatly weakened by the presence of their salts, which suppress the ionization of the hydrogen. This explains the use of acetic acid when a slight degree of acidity is desired, and the further use of sodium acetate when even that degree of acidity must be decreased.

The converse of the above example is, that the addition to acetic acid of a compound rich in hydrogen ions, such as hydrochloric acid, would result in an increase in the ionization of the hydrogen and a suppression of the acetate radical ionization.

Chemically speaking, water holds a unique position, as it is composed of hydrogen and oxygen, and ionizes into hydrogen and hydroxyl ions, which are the characteristics of acids and bases, respectively: $H_2O \rightleftarrows H\cdot + OH'$. Considering its great resistance to an electric current, it would be expected that water dissociates very slightly, and such is the case. The equilibrium ratio for water is $[H\cdot] \times [OH'] = K_{H_2O}$, the denominator being omitted as it is infinitely close to unity. Water being a weak electrolyte, the value of this equation is its ionization constant, and one of the strongest arguments in favor of the Ionic Theory is that this value has been worked out in four separate ways, and the results are in the closest possible agreement. The ionization constant of water at 22°C. is 0.000,000,000,000,01; the concentration of the hydrogen and of the hydroxyl ions is, in each case the square root of this value, or 0.000,000,1. These values, and others that, like them, are unwieldy on account of the number of ciphers, are usually written $0.0_{13}1$ and $0.0_{6}1$; they may also be written logarithmically, 10^{-14} and 10^{-7}.

A truly neutral aqueous solution is one having, at 22°C., hydrogen and and hydroxyl ion concentrations each equal to $0.0_{6}1$. *Any aqueous solution having a hydrogen ion concentration greater than this value is acid in reaction; one having a hydroxyl ion concentration greater than this, is alkaline. By common consent the hydrogen ion concentration is spoken of alone but it must be remembered that the hydroxyl ion concentration is complementary to it, their product equalling* $0.0_{13}1$ *at 22°C.*

We are accustomed to thinking of acids and bases as being diametrically opposed to each other, because those terms bring to our minds strong solutions, or, more correctly, high concentrations of hydrogen or hydroxyl ions. There is no sharp line of demarcation between acid and basic solutions, however; in acid solutions, the hydrogen ions predominate, in alkaline, the hydroxyl. The hydrogen ion concentration of a Normal hydrochloric acid solution 0.792, and its hydroxyl ion concentration $0.0_{13}126$. The fact that sodium hydroxide will react with metallic sodium with the generation of hydrogen ($NaOH + Na = Na_2 O + H$) indicates a tendency for it to yield hydrogen ions under certain conditions.

The question of the second hydrogen in water may occur to some reader; does water under any conditions demonstrate properties suggestive of a divalent acid, *i.e.*, does the second hydrogen tend to ionize appreciably? The answer is negative; the ionization of the second hydrogen, if it does occur, is so slight as to escape our present abilities to estimate it.

Water is not composed simply of molecules of H_2O; there is every reason to believe in the existence of $(H_2O)_2$, $(H_2O)_3$ and even more complex molecules. Their numerical relations to the single molecules, and to each other, are still in doubt. The complexity of aqueous solutions, when established, will without doubt be surprising.

Simple solutions can readily be adjusted to any desired degree of hydrogen ion concentration, and complex solutions can as well, since neutral salts and non-electrolytes do not influence the hydrogen ion concentrations of their aqueous solutions. The study of the true reaction of the complex solutions used as culture media in bacteriological work has been of immense value, since the optimum reaction of the media results in rapid luxuriant growth of the organisms being studied. The members of the colon-typhoid group of pathogenic bacteria must have media of hydrogen ion concentrations between 0.0_41 and 0.0_81 in which to live, and they thrive best in media between 0.0_61 and 0.0_71. These values are inconvenient to express and difficult to chart on account of the great range included between them. In biochemical and bacteriological work the term first suggested by Sorenson has been generally adopted; he recommended that the hydrogen ion concentration of solutions be indicated by the logarithm of its reciprocal, and assigned to that value the term pH: $pH = \log \frac{1}{[H\cdot]}$. A truly neutral aqueous solution, $[H\cdot] = 0.0_61$, has the pH value, logarithm $0.0_61 = \log 10{,}000{,}000 = 7$. *Acid* solutions have pH values *smaller than 7; alkaline, larger.*

Experiment C. To 500 c.c. of distilled water add 1 c.c. of U.S.P. methyl orange test solution and sufficient Normal HCl to develop a permanent pink color; about 0.5 c.c. will be required, and the pH of this solution is about 4.0. Now add 6.8 grams of sodium acetate crystals ($NaC_2H_3O_2.3H_2O$), which makes the concentration 0.1 molar. The addition of these crystals results in the discharge of the pink color, as in beaker B of *Experiment B.* Now add Normal HCl from a burette until the pink color is established again; it will be found that 40 c.c. are required—80 times as much as was required to produce a reaction of pH 4.0 in distilled water. The sodium acetate conferred upon the water the property of resisting an acidifying factor; its solution is protected against acids, or has what we call reserve acidity, meaning that a large amount of acid is required to bring about an appreciable increase in its hydrogen ion concentration.

At the stage where 20 c.c. of acid have been added, it will be found that about 21 c.c. of Normal sodium hydroxide are required to produce a red color with phenolphthalein, indicating a pH of about 9.0. At this stage the solution has both reserve acidity and reserve alkalinity. Such a solution is said to be *buffered.*

This term is used widely at present, and has established itself in the description of solutions which have the property of resisting acidifying and basifying factors; a buffered solution will require large quantities of acid or base to bring about appreciable increase or decrease, respectively, in its hydrogen ion concentration. It will be found quite simple to think of buffering action as due to substances similar to acetic acid and sodium acetate—a weak acid and its salt, and to explain this action as follows: an acidifying factor must first combine with the sodium of the sodium acetate, before sufficient acid can be present to cause a marked increase in the $[H\cdot]$, while a basifying factor must first combine with the free acetic acid, forming a salt, before any great increase in the hydroxyl ion concentration (which is synonymous with decrease in the hydrogen ion concentration) can occur.

One of the most remarkable constants in nature is the reaction of the human blood; it is very close to pH 7.4 (slightly different values are given by different investigators), and any departure from this value, even to a very slight degree, is incompatible with life. Three sets of buffering substances combine to hold its value at this point, carbon dioxide and the bicarbonates, monobasic and dibasic phosphates, and proteins (which have in the same molecule both acid and basic properties).

The determination of the hydrogen ion concentration of solutions is possible by the use of physical chemical methods. Electrometric estimation is possible, using gas cells and measuring the difference in potential between a solution of known value, and an unknown solution, both being in hydrogen cells, or by measuring the difference in potential of the solution in a hydrogen cell, and a calomel electrode (half-cell). The current is measured with a potentiometer, which is essentially a Whetstone bridge. There is, suffice it to say, a definite potential characteristic of each concentration of hydrogen ions, when examined by the gas chain methods. Such apparatus is appearing at present, in several forms on the market, and its development and drop in price will result in its use in many new ways. Heretofore, this apparatus has been available only in laboratories equipped for physical chemistry experiments, and the problems to which it has been applied have, in general, been remote from its application to routine laboratory work in a medical sense.

The erratic growths of organisms were finally recognized as due to failure to secure the proper true reaction of the media at all times by the established methods of adjustment. The whole point is, that the *ionized* hydrogen and hydroxyl groups are the ones involved in the true reaction, not the *total titrable* hydrogen or hydroxyl. The problem of improving these accepted adjustment methods remained a colorimetric one for practical purposes, and the researches of Sorenson, Michaelis and Clark and Lubs, especially, mark an epoch-making advance in this field.

We are accustomed to think of the indicators as of three classes: (i) those useful for titrating moderately weak acids and bases [litmus, rosolic acid], (ii) those useful for very weak acids as well as strong, but only for strong bases [phenolphthalein], and (iii) those useful for very weak as well as strong bases, but only for strong acids [methyl orange, Congo red]. With the aid of buffer mixtures, series of solutions of graded pH values can be prepared, and the indicators studied closely.

Experiment D.—Prepare 1 liter of each of the following solutions:

(*a*) 0.1 molar $HC_2H_3O_2$ (standardize with 0.1 N NaOH)

(*b*) 0.1 molar sodium acetate (13.6 gm. $NaC_2H_3O_2.3H_2O$ in sufficient distilled water to make 1 liter)

(*c*) 0.1 molar monobasic potassium phosphate (13.6 gm. KH_2PO_4 in distilled water to 1 liter)

(*d*) 0.1 molar dibasic potassium phosphate (13.6 gm. KH_2PO_4, 100 c.c. N KOH, distilled water to 1 liter)

With these solutions, prepare the following mixtures in clean beakers or flasks of about 100 c.c. capacity:

Flask number	C.c. 0.1 M KH_2PO_4	C.c. 0.1 M K_2HPO_4	KH_2PO_4 :K_2HPO_4	pH
1	3	48	1 :16	8.0
2	4	40	1 :10	7.8
3	8	50	4 :25	7.6
4	10	40	1 : 4	7.4
5	14	35	2 : 5	7.2
6	20	32	5 : 8	7.0
7	25	25	1 : 1	6.8
8	32	20	8 : 5	6.6
9	35	14	5 : 2	6.4
10	40	10	4 : 1	6.2
11	50	8	25 : 4	6.0
12	40	4	10 : 1	5.8

Flask number	C.c. 0.1 M $HC_2H_3O_2$	C.c. 0.1 M $NaC_2H_3O_2$	$HC_2H_3O_2$:$NaC_2H_3O_2$	pH
13	5	40	1 : 8	5.6
14	8	40	1 : 5	5.4
15	10	32	5 :16	5.2
16	16	32	1 : 2	5.0
17	24	30	4 : 5	4.8
18	30	24	5 : 4	4.6
19	32	16	2 : 1	4.4
20	50	16	25 : 8	4.2
21	40	8	5 : 1	4.0
22	40	5	8 : 1	3.8
23	50	4	25 : 2	3.6
24	40	2	20 : 1	3.4

Dilute each with distilled water to 100 c.c.; resulting concentration approximately 0.05 M.

(The pH values of these solutions are approximate only, but serve the purpose of this experiment. The following equations give approximate values of the acetate and phosphate mixtures:

$$pH = 4.7 - \log\frac{[HC_2H_3O_2]}{[NaC_2H_3O_2]} \text{ and } pH = 6.8 - \log\frac{[KH_2PO_4]}{[K_2HPO_4]}.)$$

Choose 24 test tubes of as nearly the same caliber as possible, and in each put 10 c.c. of one of these solutions. Add to each tube a few drops of a solution of methyl orange sufficient to give a definite color when the solution is viewed horizontally (the number of drops necessary will depend on the strength of the indicator solution). Make sure to use the same amount of indicator in each tube. Notice the colors obtained, and compare them with the pH values of the mixtures.

Repeat with several other indicators—alizarin (sodium monosulphonate), methyl red, Congo red, litmus, rosolic acid, phenolphthalein.

It will be noticed that with each indicator there is a range of pH values through which it shows colors neither the pure acid nor the pure alkaline, but mixtures or transitional shades between the two. Methyl orange just shows this range in the solutions below No. 20 (pH 4.2); phenolphthalein just begins to show a red color in solutions 1 and 2. Alizarin and methyl red show splendidly brilliant ranges below pH 6.0, while litmus and rosolic acid show longer ranges of transitional colors, not so brilliant, their ranges including the true neutral point of pH 7.0.

The table on the following page is quoted from Washburn, with the modification of placing in the top line the pH value corresponding to the [H·] in the second.

Careful studies of the indicators have shown that some of them are useful for accurate colorimetric estimation of [H·], while others are not. Alizarin is not as reliable as was long believed, the quality of litmus varies most erratically, rosolic acid is not consistent—only those that are definite chemical compounds themselves are of value for this work. The organic chemist has explained this, briefly, as follows: the ideal indicator is itself an acid or a base, is a weak electrolyte, and its dissociated and undissociated forms differ in intramolecular arrangement, *i.e.*, are tautomers. The colors depend on the relative amounts of the dissociated and undissociated forms present, and are therefore logarithmic functions of the [H·] of the solutions, since, as weak electrolytes, these ideal indicators obey the laws of chemical equilibrium.

It will readily be seen that, if a comprehensive series of ideal indicators were known, covering the range between pH 2.0 and 10.0, the colorimetric estimation of the true reaction of solutions, which means the [H·], would be a problem of few serious difficulties. Such a series is known, a large feature of the researches of Clark and Lubs being the development of a group of satisfactory indicators covering the above-mentioned pH range. The indicator series finally endorsed by these workers is built around methyl red and phenolsulphonphthalein; the other members of the series are chemical derivatives of these two, and some of these were synthetized for their purpose. This list is given below, using the common names of the indicators only; the chemical names and methods of preparation must be obtained from the original papers. The range mentioned, in each case, is the useful range, *i.e.*, the range through which they show transition colors. [These indicators, as weak electrolytes, have definite ionization constants, which values are the mid-points of each useful range.]

—COLOR REACTIONS OF INDICATORS IN SOLUTIONS OF DIFFERENT HYDROGEN-ION CONCENTRATIONS*

$pH = \log \frac{1}{[H+]}$	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Acidity = $[H+]$	1	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	10^{-9}	10^{-10}	10^{-11}	10^{-12}	10^{-13}	10^{-14}
Alkalinity = $[OH^-]$	10^{-14}	10^{-13}	10^{-12}	10^{-11}	10^{-10}	10^{-9}	10^{-8}	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-3}	10^{-2}	10^{-1}	1
Dimethylamidoazo-benzene	cherry-red	→	→	flesh-colored	golden-yellow	←	←	←	←	←					
Methyl Orange	rose-red	→	→	→	orange-red	yellow	←	←	←	←					
Sodium Alizarin-sulphonate	greenish yellow	→	→	→	→	→	red	←	←	←	←	←			
Rosolic Acid			→	yellow	→	→	→	rose	red	←	←	←			
Guiac Tincture				→	color-less	→	→	→	greenish yellow	←	←	←	←		
Phenolphthalein					→	color-less	→	→	→	red	←	←	←	←	
Thymolphthalein							color-less	→	→	→	blue	←	←	←	
Tropaolin O								yellow	→	→	→	→	orange-yellow	←	←
Trinitrobenzene										color-less	→	→	→	orange	←
Benzopurpurin											yellow	→	→	→	red
Methyl Red			→	red	→	pink	yellow	←	←						
Congo Red			→	blue	violet	reddish violet	orange	orange-red	←	←					
Litmus			→	red	red	red	red-violet	violet	blue	←	←				
Cochineal			→	→	yellow	yellow-pink	lilac	←	←						

* Washburn's "Principles of Physical Chemistry", (1915), p. 333. → Indicates continuation of the color. **The heavy black line indicates a change of color or end point.**

Indicator	Concentration, per cent	Color change	pH Range
Thymol blue	0.04	red to yellow	1.2–2.8
Brom phenol blue	0.04	yellow to blue	3.0–4.6
Methyl red	0.02	red to yellow	4.4–6.0
Brom cresol purple	0.04	yellow to purple	5.2–6 8
Brom thymol blue	0.04	yellow to blue	6.0–7.6
Phenol red (phenolsulphonphthalein)	0.02	yellow to red	6.8–8.4
Cresol red	0.02	yellow to red	7.2–8.8
Thymol blue	0.04	yellow to blue	8.0–9.6
Cresol phthalein	0.02	colorless to red	8.2–9.8

With such a series of indicators available, the determination of the true reaction of a clear colorless solution is not at all involved, provided that it contains nothing to change the indicator chemically, and that the concentration of the salts and proteins especially be not too great. The procedure consists of two steps; firstly, the approximate reaction of the solution is determined by using as many of the above indicator solutions as necessary, and, secondly, the comparison of the color of the solution under examination with that of a standard solution, using the indicator within whose useful range the reaction of the solution lies. Suppose a solution shows a red color with phenol red, and a yellow with thymol blue; its reaction lies between pH 7.0 and 8.0, and is determined accurately by comparing its phenol red color with the colors of a series of standard solutions between 7.0 and 8.0 to which phenol red solution is added. The reaction of the solution is that of the standard which it matches; if the color is between two of the standards, the reaction of the solution is intermediate. Interpolation midway between standards of 0.2 pH intervals is readily made.

The scope of this outline will not allow of a detailed discussion of the preparation of the standard solutions. Suffice it to say that for this purpose Clark and Lubs (whose technique is followed at this institution) use the following series of buffer mixtures for standards, and each solution, before use, is checked electrometrically by means of gas chain and potentiometer.

[Repeated purification by recrystallization is necessary in the case of the salts; the use of 'conductivity' water, and the preparation of a sodium hydroxide solution which is carbonate-free make the preparation of these solutions far from a simple procedure. Once made, the different

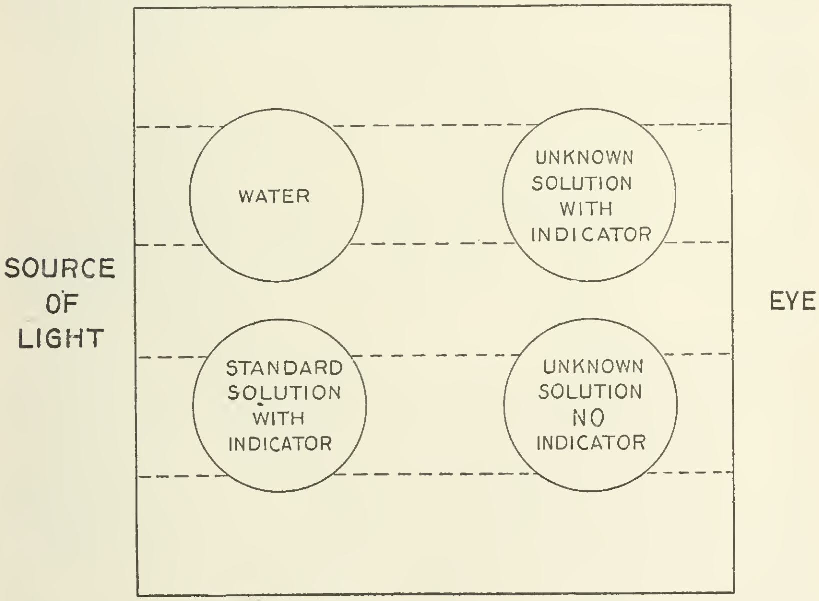
Buffer mixtures	pH Ranges
Potassium chloride–hydrochloric acid	1.0– 2.2
Potassium acid phthalate–hydrochloric acid	2.2– 3.8
Potassium acid phthalate–sodium hydroxide	4.0– 6.2
Monobasic potassium phosphate–sodium hydroxide	5.8– 8.0
Boric acid with potassium chloride–sodium hydroxide	7.8–10.0

mixtures are kept in bottles of the very best grade of glass and protected from access of air and light.]

The use of these indicators and standard buffer mixtures in the adjustment of the reaction of bacteriological media was begun in the summer of 1918 at this institution, and has been continued with increasing satisfaction and confidence. The question of more or less permanent standards arose, and was met first by the use of standard solutions, with indicator added, in test tubes closed with corks wrapped in tin foil. These solutions were found to hold their colors very well for a number of weeks, when carefully protected from the light when not in actual use, and kept tightly corked. The sealing of these solutions in ampoules was next tried, and found to be very satisfactory, if the ampoules were of the best quality glass. Phenol red sets were sent out to the larger Army laboratories at three or four month intervals, and the use of this method of adjustment of the reaction of media was urged. On renewal, the return of the old sets was requested, and their colors compared with those of fresh standards. At first, these comparisons showed marked changes in the old sets, the tubes above 7.6 as a rule showing the intensest possible color with phenol red, showing a reaction at least as alkaline as 8.4. (The phenol red range is extensive enough for media adjustment for routine work with the ordinary pathogenic bacteria.) As the quality of the glass of the old sets improved, the changes became less marked, and at present the standard sets distributed from the Army Medical School are test tubes of Pyrex or Non-sol glass, drawn out in the upper third before the addition of the solutions, and then sealed in a blast. We hope that these standards will prove to hold their colors very truly for at least five or six months.

In the most accurate possible procedures of estimating the hydrogen ion concentration of solutions colorimetrically, it is obvious that constant quantities of solutions and indicators must be used, as well as test tubes of identical size, as suggested in *Experiment D.*

The reaction of solutions that are themselves cloudy or colored, or both, can nevertheless be estimated colorimetrically, except in the case of most intensely marked color and turbidity. The simplest device with which this can be done is the colorimeter first described by Hurwitz, Meyer and Ostenberg, but any colorimeter which allows of the comparison of the composite color of a pair of solutions, in thin layers, with the color of another pair, will serve the purpose. This colorimeter, frequently spoken of as a "comparator", can be improvised in any shop as follows: a block of wood approximately 2 x 3 x 3 inches is bored 2½ in. deep to hold four test tubes vertically. Two holes of smaller diameter (⅔) than these are bored horizontally across each pair, centered carefully upon them. The block is then stained or painted a dull black inside and out. The position and contents of the tubes are shown in the diagram:


SOURCE OF LIGHT
WATER
UNKNOWN SOLUTION WITH INDICATOR
STANDARD SOLUTION WITH INDICATOR
UNKNOWN SOLUTION NO INDICATOR
EYE

We have found it to be convenient frequently to use a comparator bored for three pairs of tubes, allowing the comparison of an unknown with two standards, one on either side. Our colleague, Maj. George C. Dunham, Med. Corps, suggested the combination of a Kober (or Duboscq) colorimeter with a comparator as follows: the cups of the Kober are removed, also the plungers, the stages set at equal heights, and a comparator with vertical viewing holes, and holding the tubes at an angle of about 30° to the horizontal, is strapped on with an elastic band. The result is most satisfactory.

In the case of complex solutions that are themselves so intensely cloudy or colored that viewing through layers such as the ordinary test tube (12 to 15 mm.) is impossible, dilutions can be made up to 1:5 without changing the pH of the dilution greatly from that of the undiluted solution. This is especially true in the case of solutions whose reaction is near the true neutral point.

The solutions used as bacteriological media are complex, but are nevertheless comparable in many ways to the solutions described in *Exp. C.* That is, media are in some cases naturally buffered, in others not. The presence or absence of buffering substances will have a tremendous influence on the final true reaction of media adjusted according to the established methods of making neutral to phenolphthalein and then adjusting to 1 per cent, 2 per cent, etc., acid on the basis of the preliminary titration. An unbuffered solution, adjusted to 1 per cent acid, would have a true reaction of very acid pH value—around 5.0, while a buffered media solution adjusted 1 per cent acid to phenolphthalein might still be as alkaline as 7.8 or 8.0.

One other aspect of buffering substances in media is that, in work where the reaction of a media is to be held at a definite value, and where it is not naturally buffered, or is buffered very slightly, buffer mixtures can be added to it and great degrees of reserve acidity and alkalinity be conferred upon it with surprisingly small concentration of the buffering substances. The following studies of the various media will show the application of many points mentioned so far from a chemical point of view.

Chart One shows the difference between a medium containing no buffer; *i.e.*, plain extract broth, and one buffered with the natural buffers of beef muscle and blood; *i.e.*, plain infusion broth. It will be seen that the infusion is driven up or down the pH scale to a lesser degree than the extract, which fact materially aids in the growth of organisms, the optimum pH being held over a greater period of time. Thus it is not the increased nutritive power of the infusion broth alone which aids the growth of bacteria, but also the amount of buffer present.

Chart Two illustrates the buffer action of varying amounts of 0.05 M phosphate buffer solution, pH 7.8, when the plain extract broth is titrated with different amounts of N/1 HCl per liter. The protective influence of the OH ion in the phosphate buffer solution is best seen with a pH 7.8, for in this solution the dibasic salt is in excess, and serves to act against the acidifying factor.

Chart Three illustrates the buffer action of a 0.05 M phosphate buffer solution, pH 7.6, and it is seen that, while there is a protective action, the amount of dibasic salt here is less than in the previously mentioned buffer solution, and is therefore more easily overcome by the acidifying factor.

Chart Four illustrates the buffer action of a 0.05 M phosphate buffer solution, pH 7.4, and in this case the cause of the very slight excess of dibasic salt over the monobasic the protective value of the solution is small. Also, at this concentration, 0.05 M, 200 c.c. are of no more value as a protecting agent than 100, the dibasic salt being entirely overwhelmed by the acidifying factor.

The Second, Third and Fourth Charts serve to illustrate graphically the fact that when protecting media against the production of acid by bacteria, it is necessary to use phosphate buffer solutions of suitable pH. In this case, one well up on the alkaline side of the pH scale, in order that the excess of H ion in the acid produced may be properly balanced and not allowed to remain free.

Charts Five, Six and Seven are used in the same manner as Charts Two, Three and Four, and show the protective value of phosphate buffer solutions of varying pH against a basifying factor. Chart Five shows the protective power of the more acid buffer (7.4); it having a plentiful supply of monobasic salt. The medium in this case is well buffered against the basifying factor. Chart Six shows less protection than Five a 0.05 M phosphate buffer solution of pH 7.6 being used, 200 c.c. of this solution giving the same result as 100 c.c. of the pH 7.4 solution (Chart Five).

Chart Seven shows the very slight protective power of a phosphate buffer solution of higher pH (7.8) against the basifying factor, for the OH ions overwhelm the monobasic salt. Increasing the concentration of the buffer does not give any added protection.

Charts Five, Six and Seven show us that any attempt to buffer media against the production of an alkali by an organism must be done with a solution containing an appreciably quantities of monobasic salt.

Chart Eight illustrates the dissociation of the hydrogen ions in a medium at varying temperatures. The plain extract broth medium used here has a pH of 8.4 at room temperature (20°C.) and a pH of 7.4 at 70°C., and the varying pH values indicated at the intervening temperatures. It is necessary to adjust titrations so that the end point will be the pH desired at the temperature at which the medium will actually be used. This can be done by the use of a constant temperature bath and by adjusting the reaction of the medium in preparation at exactly the required temperature. It must be remembered that pH 7.0 is the true neutral point only at room temperature (± 20°C.); variations in temperature from this value alter our total pH scale, hence it is essential to determine and include, in our definitions of optimum pH values, the temperature.

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Chart ONE

Comparative titration of Plain beef extract broth and Plain beef infusion broth.

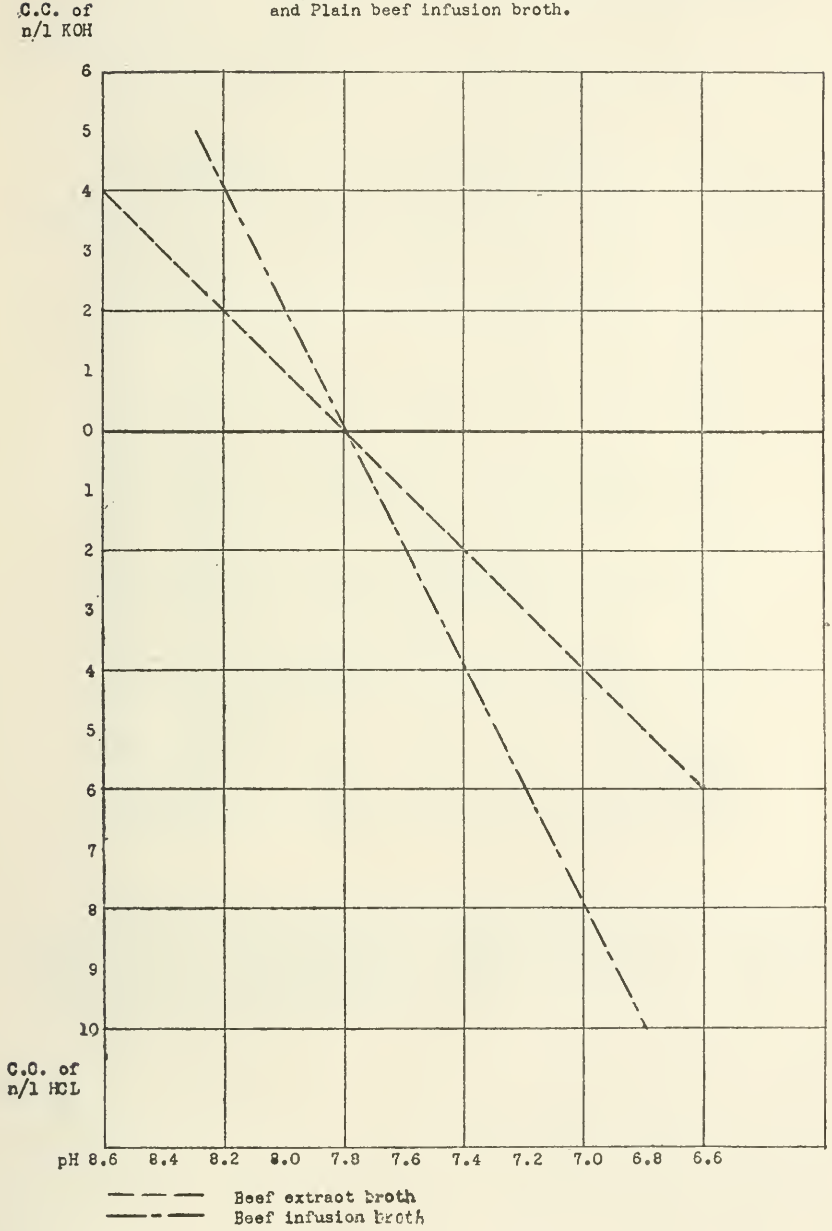


Chart TWO

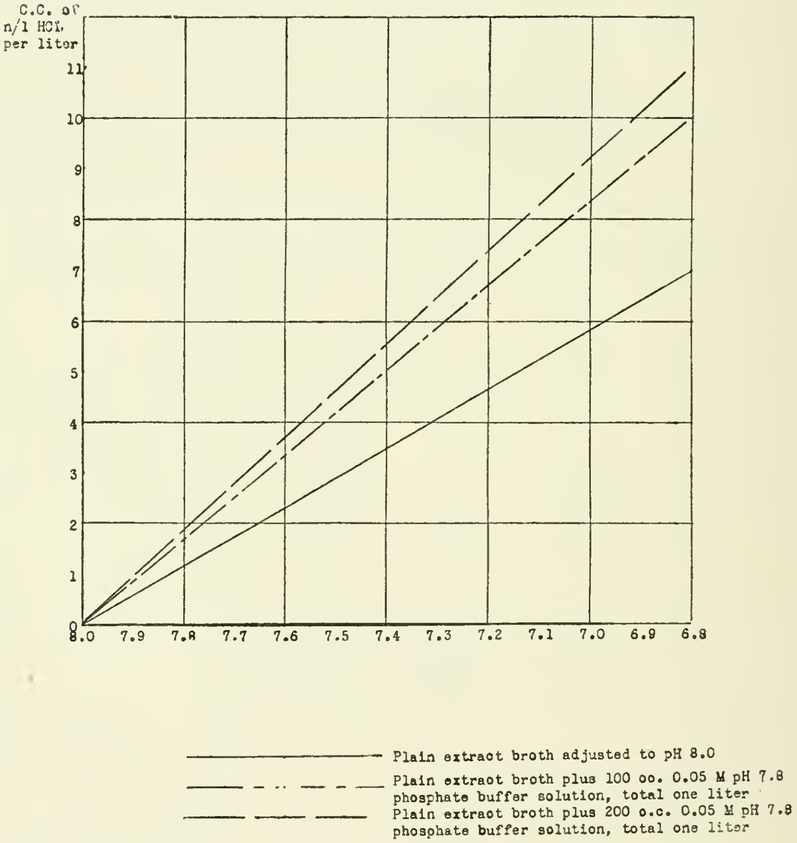

C.C. of n/1 HCl. per liter
0
1
2
3
4
5
6
7
8
9
10
11
8.0
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7.0
6.9
6.8
Plain extract broth adjusted to pH 8.0
Plain extract broth plus 100 cc. 0.05 M pH 7.8 phosphate buffer solution, total one liter
Plain extract broth plus 200 c.c. 0.05 M pH 7.8 phosphate buffer solution, total one liter

Chart THREE

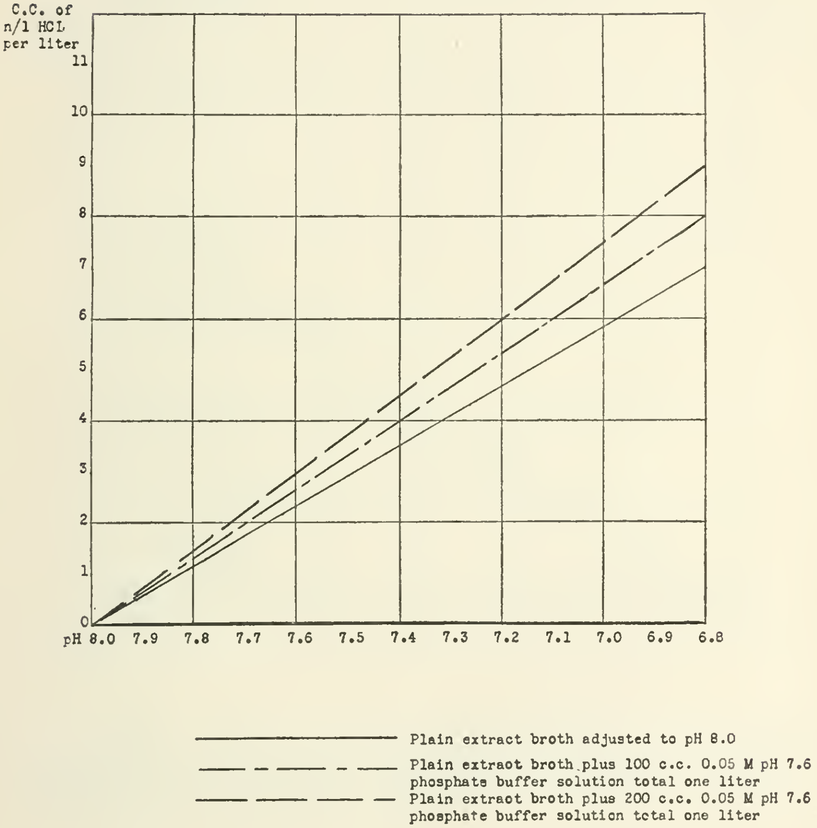

C.C. of n/1 HCL per liter
11
10
9
8
7
6
5
4
3
2
1
0
pH 8.0
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7.0
6.9
6.8
Plain extract broth adjusted to pH 8.0
Plain extract broth plus 100 c.c. 0.05 M pH 7.6 phosphate buffer solution total one liter
Plain extract broth plus 200 c.c. 0.05 M pH 7.6 phosphate buffer solution total one liter

Chart FOUR

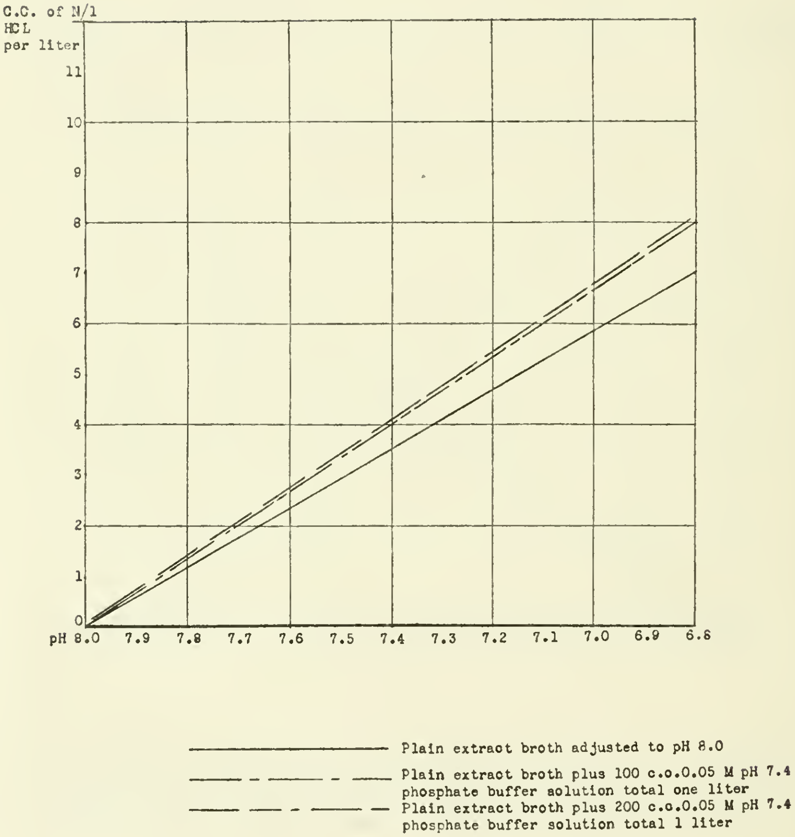

C.C. of N/1
HCL
per liter
11
10
9
8
7
6
5
4
3
2
1
0
pH 8.0
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7.0
6.9
6.8
Plain extract broth adjusted to pH 8.0
Plain extract broth plus 100 c.c.0.05 M pH 7.4 phosphate buffer solution total one liter
Plain extract broth plus 200 c.c.0.05 M pH 7.4 phosphate buffer solution total 1 liter

Chart FIVE

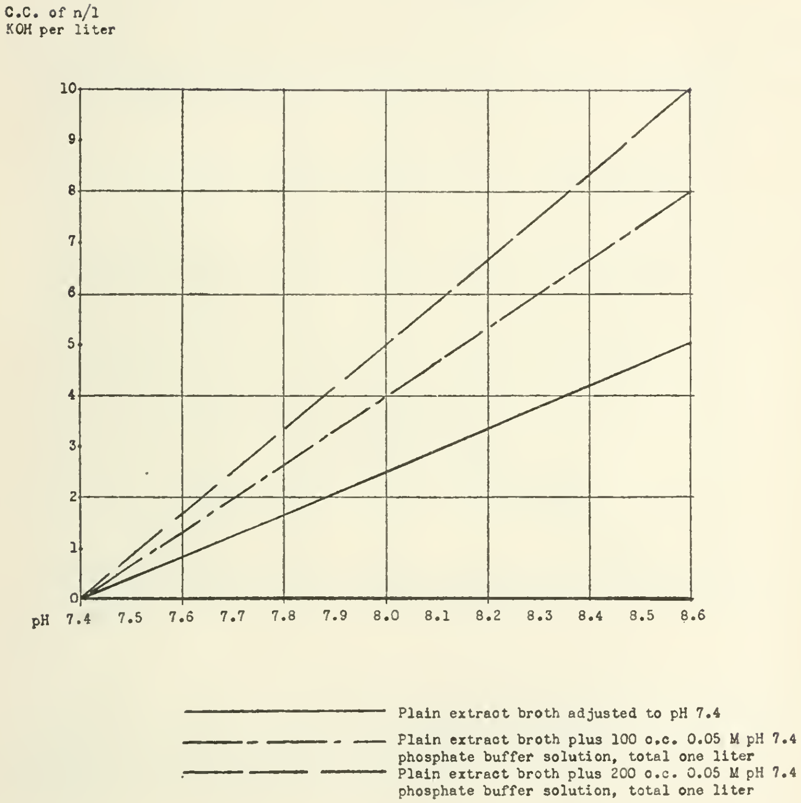

C.C. of n/1
KOH per liter
10
9
8
7
6
5
4
3
2
1
0
pH 7.4
7.5
7.6
7.7
7.8
7.9
8.0
8.1
8.2
8.3
8.4
8.5
8.6
Plain extract broth adjusted to pH 7.4
Plain extract broth plus 100 c.c. 0.05 M pH 7.4 phosphate buffer solution, total one liter
Plain extract broth plus 200 c.c. 0.05 M pH 7.4 phosphate buffer solution, total one liter

Chart SIX

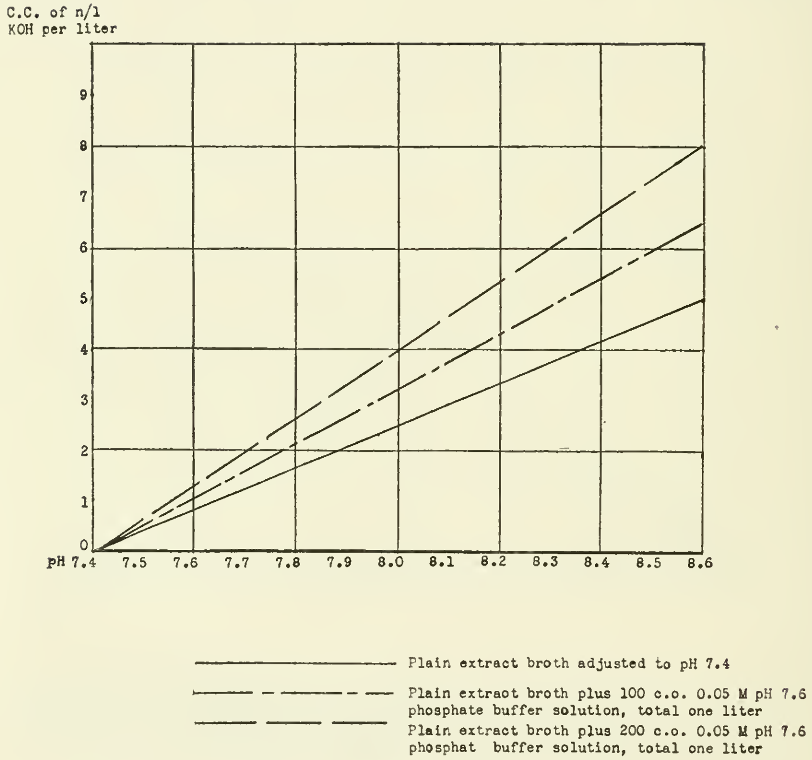

C.C. of n/1
KOH per liter
9
8
7
6
5
4
3
2
1
0
pH 7.4
7.5
7.6
7.7
7.8
7.9
8.0
8.1
8.2
8.3
8.4
8.5
8.6
Plain extract broth adjusted to pH 7.4
Plain extract broth plus 100 c.c. 0.05 M pH 7.6 phosphate buffer solution, total one liter
Plain extract broth plus 200 c.c. 0.05 M pH 7.6 phosphat buffer solution, total one liter

Chart SEVEN

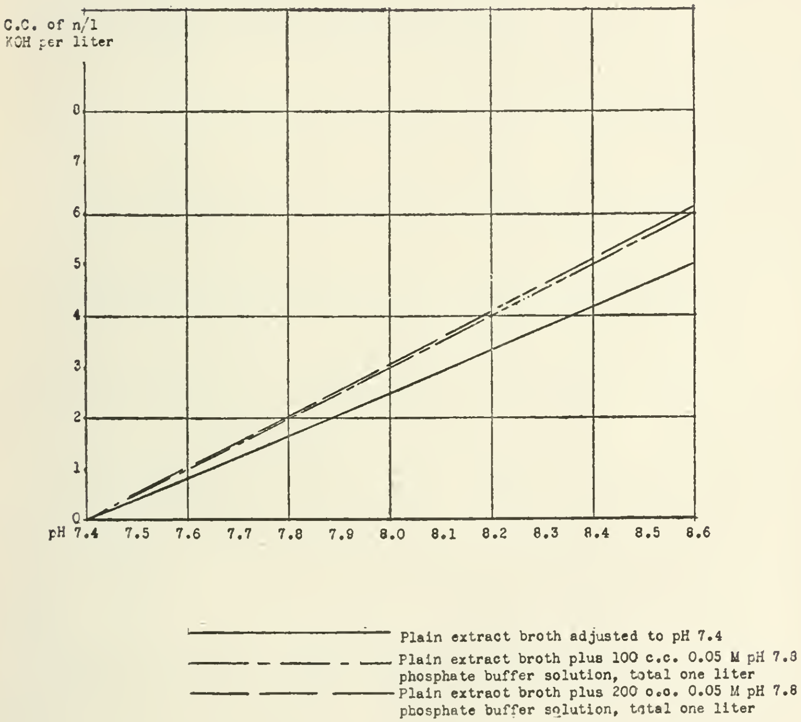
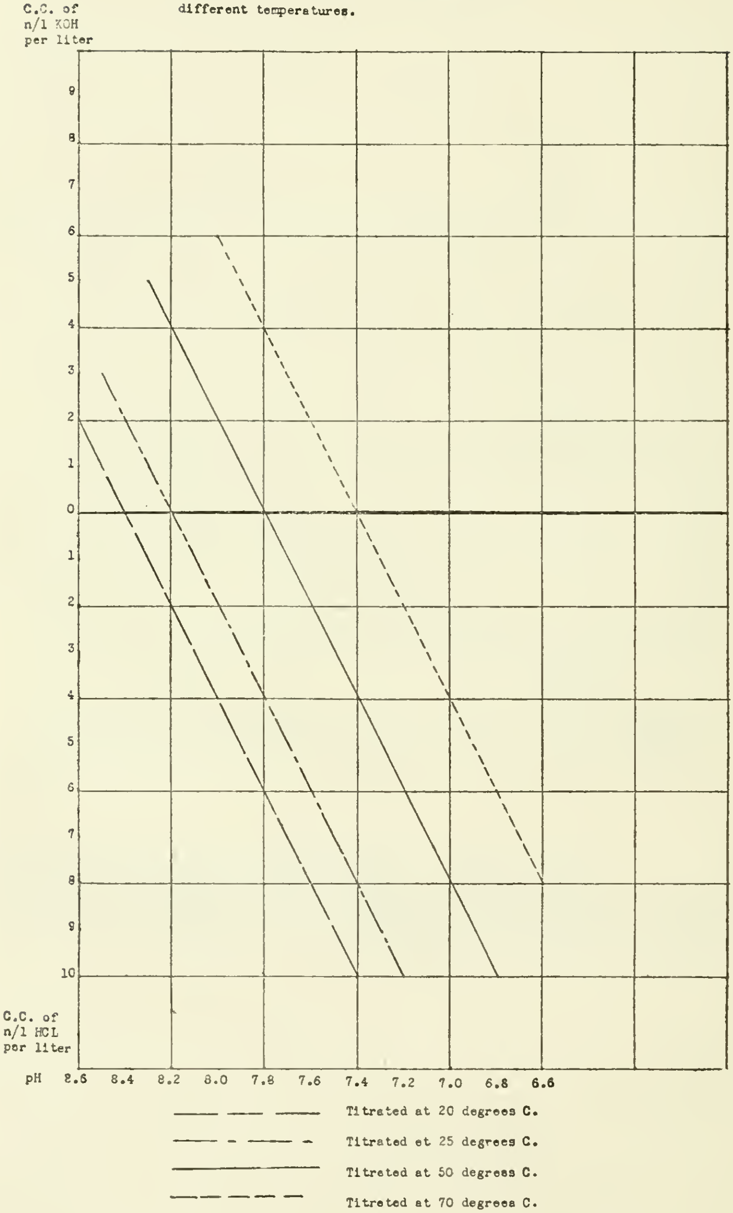

C.C. of n/1
KOH per liter
0
1
2
3
4
5
6
7
8
pH 7.4
7.5
7.6
7.7
7.8
7.9
8.0
8.1
8.2
8.3
8.4
8.5
8.6
Plain extract broth adjusted to pH 7.4
Plain extract broth plus 100 c.c. 0.05 M pH 7.8 phosphate buffer solution, total one liter
Plain extract broth plus 200 c.c. 0.05 M pH 7.8 phosphate buffer solution, total one liter

Chart EIGHT

Comparative titrations of the same media at different temperatures.



THE RENAISSANCE OF MEDICINE IN CHINA

E. V. COWDRY

(With eight illustrations)

NATIVE physicians toy with life and death throughout China with child-like faith in the principles of medicine as laid down by the mythical Yellow Emperor, Huang-ti in about 2696 B. C. The ideas enunciated by him and his followers are very deeply rooted in this great nation of approximately four hundred million people.

The doctrine of acupuncture, or of healing through pricking with needles, is productive of untold misery. In the courtyard of the Temple of the Universe (Tung Yueh Miao), just outside the East Gate of the Tartar City of Peking, on Chinese New Year, it is possible to watch the specialists at work. Patients are attracted by the display of a brightly painted chart illustrating different ailments and their cure through acupuncture. After the usual preliminaries the operator selects an appropriate needle, a short one for facial work or a long one for the thorax or abdomen, and plunges it into the body. Between acts he sterilizes it by passing it slowly through his hair. Sometimes the needles are used red-hot. A large bronze figure may be seen in the College of Imperial Physicians in Peking with numerous holes illustrating the position of the puncture points which is used as a sort of standard in acupuncture. I am told that schools of acupuncture are maintained, which, however, do not invite foreign inspection, and that teaching is carried on with the aid of similar statues. At the time of examination the statues are said to be covered with paper and the students required to insert needles at strategic points. By this ingenious method the students who have not learned the exact position of the holes are eliminated. After they have learned their trade, largely through apprenticeship, they begin to practice independently. They claim to refund the money which has been paid when cures are not made. The residences of well-to-do physicians are marked by a display of testimonial tablets from grateful patients. Juliet Bredon says, in her book on Peking, that a physician visiting a lady, merely hands a small figure of a nude woman through the curtains on which she marks the location of her trouble. He then prescribes for her. A great deal has been written about Chinese drugs, but few realize how many millions of dollars are spent on them annually. At a very famous store in Peking, established over three hundred years ago, they claim to sell one thousand dollars' worth of native drugs a day. This native medicine is not all bad, but, considering its amount, it has a surprisingly small element of good in it.

Chinese are by nature very superstitious and are continually preyed upon by the priests. Our richshaw coolie suffering from a cold goes to a priest, obtains a paper dragon which he burns and drinks with his tea. In the above mentioned temple of the Universe the God and Goddess of medicine may be seen in the shape of two mules. On Chinese New Year the sanctuary is crowded with the halt, the lame, and the blind. Standing in the incense-laden air, listening to the monotonous tones of a great bell sounded by a ragged priest with a piece of wood carved to represent a human thigh bone (the Mongolians use the femur of a virgin), the scene is certainly impressive. The male mule of brass is the most venerated. After making a small contribution to the priest and suitable obeisance, the faithful draw near and rub the part that ails them and then the corresponding part of the mule. The eyes worn smooth in this way bear mute testimony to the terrible incidence of blindness in North China. The female mule is used in the same way by women. This method of healing through contact is very widely practiced. In the South the image chosen is often that of an elephant.

It is not difficult for us to recall equally bizarre practices in Europe. The real difference between China and Europe or America is one of degree, not of kind. China is steeped in superstition; we are beginning to emerge from it.

The following agencies are concerned in the development of modern medicine in China:

1. *Foreign Missionaries.* Most of the pioneer work has been accomplished through the energy and devotion of foreign missionaries who have labored faithfully in the face of prejudice and superstition. In 1913 the China Medical Missionary Association passed the following resolutions, which make their purpose clear:

"1. That in establishing medical colleges and hospitals our sole object is to bring the blessings of healing to the souls and bodies of the people of China, and to give a thorough training in medicine and surgery to young men and women of education and intelligence, enabling them as fully qualified doctors to be of the highest service to their country.

"2. That we do not desire to create permanently foreign institutions, and that our aim and hope is that these medical colleges will gradually and ultimately be staffed, financed, and controlled by the Chinese themselves.

"3. That we desire to bring our teaching work into line with the regulations of the Ministry of Education and in all ways to coöperate with and assist the Government of the Republic in medical education, so that a strong and thoroughly equipped medical profession may be established in this great land."

2. *Foreign Agencies of Non-Missionary Character.* The British Government has materially aided in the development of modern medicine in the South of China. It has been particularly successful in securing the good will and active support of wealthy Chinese in founding the medical department of the University of Hongkong. Even the President of China showed his interest in the enterprise by establishing the "Ta Tsung T'ung Ch'uan Hsueh Fei" fellowship for university students. The school buildings are up-to-date in every particular and command a magnificant view of the harbor. The equipment is excellent, the surroundings the finest and most healthful along the South China coast, all that is needed to make the medical department one of the best and most attractive in all China is an adequate full-time staff. The future of the institution is very bright in view of the broad-minded attitude of the authorities, that it is the purpose of the medical school to serve the whole of South China, not merely the colony and Chinese of British nationality.

The Germans made good beginnings at Shanghai and Tsingtau which were interrupted by the war. The Shanghai school was located in the French Concession and was maintained in close affiliation with a strong engineering department financed largely by Krupp interests. After the seizure of the buildings with part of the equipment by the French authorities the teaching was transferred to the Tung Chi and Paulun Hospitals in the International Settlement. Many of the German instructors were deported and the remainder forbidden to enter either of these hospitals, so that at present most of the actual instruction is given to the students by two German doctors in private houses just across the street. The other medical school at Tsingtau has been taken over by the Japanese but is not being operated by them.

The Japanese are very active in the introduction of modern medicine. They maintain hospitals in the larger cities, the three most important of which, at Peking, Shanghai, and Hankow, are controlled by a philanthropic society under the presidency of the distinguished statesman, Count Okuma. The Japanese Medical School at Mukden is an excellent institution, strong in its large full-time staff of teachers. While it is actually owned by the South Manchuria Railway Company, it is nevertheless under strict government supervision.

The China Medical Board of the Rockefeller Foundation is responsible for the most recent advances. The work it has undertaken is as follows:

1. To support the Peking Union Medical College, formerly a mis-

sionary institution in North China, more land has been purchased and new buildings erected at a cost of about seven million dollars. A faculty of high scientific attainments has been assembled from the United States, Europe and China. It is the hope of the Board to make the work of this school equal to that of a first class medical school in any other part of the world.

2. To assist other medical schools already established. Grants have been made to several schools under missionary auspices. Assistance may be granted later to others.

3. To aid in pre-medical education. A pre-medical school has been established in Peking and appropriations have been made for several colleges to strengthen their scientific work.

4. To assist missionary societies to strengthen a few strategically located and well-managed hospitals by providing equipment and other facilities and by making annual grants toward the support of additional physicians and nurses.

5. To provide scholarships for a few Chinese and missionary doctors in the United States and for a larger number of doctors for graduate work at Peking.

Up to June, 1920, the China Medical Board has spent almost $7,000,000 on the physical plant of the Peking Union Medical College alone. Full details may be learned from the annual reports of the General Director of the Board which may be obtained at the office of the Rockefeller Foundation, 61 Broadway, New York.

3. *The Chinese themselves.* The work of the Chinese Government should be most carefully considered. The Army Medical School, the Naval Medical School, the National Medical College, and the five Provincial Medical Schools are a good foundation on which to build. They represent a conscientious attempt on the part of the Government to assume responsibility for the introduction of modern medicine. Military discipline is maintained at the Army Medical School as indicated by the guard at the entrance. The buildings are laid out on a comprehensive plan and are quite up-to-date. The late President, Yuan Shih-Kai, declared that "For a country to be strong and prosperous, it is essential that its citizens be healthy."

Unfortunately, these schools have received very little foreign support and it is doubtful whether they will accept any. One of their directors told me that open coöperation with a foreign institution might have a bad effect upon his annual budget owing to anti-foreign feeling. The condition is not improved by the attitude of some medical missionaries, who take but little interest in the Chinese schools because they see in them no opportunity for evangelistic work. One doctor dismissed the question by saying that "it is difficult to coöperate with them because they are only heathens anyway."

The case of the Kung Yee Medical College is instructive. This school belongs to a group of well-to-do Chinese in Canton. It has excellent buildings in a fine location and, until recently, had a fairly complete staff. The instruction given was of a relatively high grade. The educational policy was under the control of an executive committee in which foreign influence predominated. A proposal was made to become affiliated with the Canton hospital (missionary) which was apparently acceptable to all parties. At the last moment, unexpectedly and in an unconstitutional way, the Chinese members of the Kung Yee Society refused to ratify the agreement. The missionary element in Canton is now almost unanimous in declaring that they can place no more confidence in the Kung Yee Society and that further negotiations are impossible; all of which goes to show that more tolerance is often needed on both sides.

Unfortunately, also, Chinese schools have been unable to keep pace with the rapid advances in foreign controlled institutions which tend to attract the best students. With a depleted treasury the Government may prove reluctant to make large expenditures to accomplish something which the foreigners will do for them *gratis*. Millions can easily be borrowed for aeroplanes but next to nothing to protect the health of the nation. Foreigners are paid regularly, because they demand it, but no salaries have been paid at the Army Medical School for the last five months (May 30, 1920). According to the North China Star (May 13, 1920) "The Chinese Government has discovered that it has a savings account with a credit balance of five million dollars in the Russo-Asiatic Bank. The amount was placed there by the old Imperial Board of Education in Manchu days, when the department of education was one of the wealthiest in the government. Owing to the confusion incident to the change of regime, and the disappearance of the officials who deposited the money, the account was entirely lost sight of." Indeed one almost regrets its discovery at a time when its expenditure cannot be properly controlled.

Very skilful and diplomatic assistance is called for. The attempt of the republican government to look after its own medical education should not be allowed to languish for want of foreign interest and support. The buildings of the Chinese schools are usually adequate for present needs but an attempt might well be made to improve the library accommodations and to strengthen the teaching staff. The addition of one or two really well-trained Chinese, who have traveled abroad, to one of these colleges, with a liberal salary guaranteed would soon react favorably upon the whole institution. Men of the right type who appreciate the importance of these government schools and who realize what ought to be done and how to go about it are not hard to find if one knows where to look for them. It is important also that members of the staff already under appointment should be given an opportunity to travel so that they may be able to broaden their outlook and return with new ideas. Care should, however, be taken not to repeat Japan's mistake (now being rectified) of sending only young men abroad, for they come back flushed with enthusiasm only to break themselves against the stone wall of the conservatism of their elders. A few of the older and more influential officials should be encouraged to travel and arrangements be made for their proper reception abroad.

The underlying difficulty is the deeply rooted conviction, handed down for forty centuries, that the medical profession is but a fourth or fifth rate occupation. The entering classes of all the medical colleges combined amount to less than six hundred. This cannot be attributed to inadequate provision for premedical training, which can be easily obtained in Peking, Shanghai, Hongkong, and all the larger cities. It is interesting to note, for comparison, that the University of Toronto has an entering class in the medical school of 416 students who will work in a country of about eight millions, already well stocked with doctors. We cannot change the sentiment of a nation like China over night nor yet in fifty years' time, but a beginning has been made in Peking, for example, where the splendid buildings of the new medical school of the Rockefeller Foundation will surely lead people to doubt whether, after all, the medical profession is so very degrading. The raising of a despised trade to the level of a dignified profession requires long and sustained effort throughout the country, but until it has been accomplished, we cannot hope for any real development of modern medicine in China.

The people generally look upon disease and sickness in an apathetic and fatalistic way, believing that it is a visitation of Providence in punishment for their transgressions, or at any rate that it is the will of God, as our forefathers thought in Europe several hundred years ago and some continue to think while such views prevail there can be no real progress. This tendency to shift the responsibility from their own shoulders is characteristic of the Chinese in all their dealings, and will be very difficult to correct. They are handicapped also by certain customs like foot binding, and the binding of the breasts in young women before marriage, which they still practice blindly, having forgotten their origin and not troubling to ask the why or the wherefore. They make their women cripples for life and peculiarly susceptible to certain kinds of disease. I am surprised to find the impression among foreigners that foot binding is rapidly going out of date. No greater mistake could be made. The small sheds in the rear where, in some districts, the girls are kept during the time when the pain is most acute and they are apt to disturb the peace of the household, are just as well patronized as ever. Only in Chinese under direct and continuous foreign influence is a change noticeable.

The fruits of our efforts to introduce modern medicine into China will fall on very stony ground unless a nation-wide campaign is carried on by Chinese and foreigners alike for the education of public opinion. At present the graduates of the schools which have been established are regarded with indifference or active distrust by the vast majority of their countrymen. It is particularly difficult for those of them who have to go into the interior, away from the thin film of foreign influence, to live up to their new ideals, in the face of universal incredulity and without sympathy or assistance of any kind. A beginning is being made from several angles without proper coördination and on a very small scale. Professor John Dewey of Columbia University is perhaps doing more than any one person to divert the funds squandered by the militarists into educational channels and to lead the mass of the people to see themselves as others see them and to assume full responsibility for the orderly development of their own lives. During vacations some of our students make a practise of giving public lectures on hygiene and preventive medicine; but what are one or two among so many? I am thoroughly in sympathy with Doctor Peter's public health campaign but I should like to see it on a much larger scale like the world-wide demonstrations of the International Health Board. The Chinese people are not devoid of business instinct and I am inclined to think if it were demonstrated to them repeatedly how much may be actually gained by improved sanitation and through an intelligent appreciation of the principles of hygiene, that they would not be unresponsive. It might be possible to work through the strong and influential business guilds as well as through governmental agencies. Every means of publicity should be utilized and the vernacular press pushed to the limit in a concerted attempt to educate the general masses of the population to a realization and appreciation of the good work which is being done in the medical schools and hospitals throughout China, emphasis being placed upon those under Chinese control.

At the same time wealthy merchants and business men should face their duty to their own country. It would not be at all a difficult matter to select a group of five or six Chinese in each of the great cities of Hankow, Shanghai and Canton who could, with but little personal sacrifice, establish and maintain a medical school on an equally efficient and elaborate scale to that founded through the generosity of an American citizen in Peking. The example has been set and I think that we can count on its being followed.

Great improvements may certainly be expected within the next fifty years. The China of today, ridden with disease, with its underfed millions, and its appalling death rate, will be born again. Modern medicine will add ten years to the life of the average individual, as has been done in other parts of the world, and the population will increase ever more rapidly. The young and vigorous will seek more ardently "for new worlds to conquer." We have seen what the old China can do but no man can yet foretell the potentialities of China after her renaissance.

Already there are unmistakable signs that the leaders of the rising generation in Japan realize that the future of their country is bound up with that of China. A new foreign policy will certainly be inaugurated, the purpose of which will be the establishment and maintenance of friendly relations between the two countries. The Japanese foreign office will be farsighted enough to understand that this "rapprochement" cannot be effected without considerable sacrifice on their part, which, however, they will gladly make because they will know that Japan isolated, alone and distrusted by China can never become a formidable, world power. The great adjustment will come when these nations of the East are united and present a solid front to the rest of the world.

Scientific investigation may, nevertheless, reveal to us what we are to expect. Thus far "diplomacy" has been uppermost in all adjustments between the East and the West. Agreements with respect to immigration and other matters have been entered into for economic reasons and in order to protect "special interests." They have not been based upon a careful consideration of the potentialities of the Chinese race who will soon become the dominating element in the Eastern group. Those who control our foreign policy have been content to act upon the advice of retired missionaries and business men who, though they have had years of experience in China, are not trained observers. The matter should be narrowed down to a scientific problem and amateur opinion displaced by professional advice.

It is imperative that we should learn to know the Chinese through the study of the science of anthropology. Owing to the widespread prejudice which still exists in China against human dissection, our knowledge is at present little more than skin deep. Soon, however, with more enlightened public opinion, we shall be in a position to study the Chinese through and through so that nothing will be hidden from

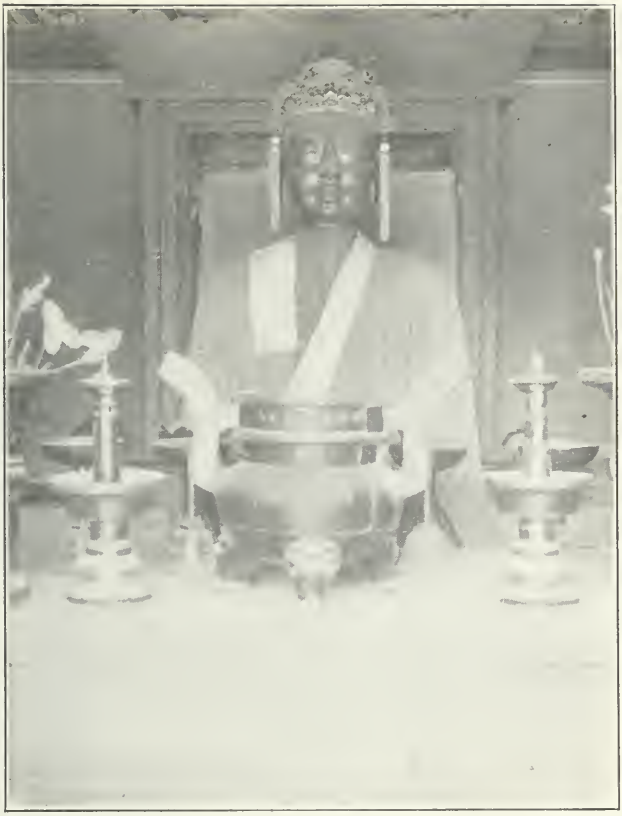


Fig. 1.—A large bronze figure may be seen in the College of Imperial Physicians in Peking with numerous holes illustrating the position of the punctured points which is used as a sort of standard in acupuncture.

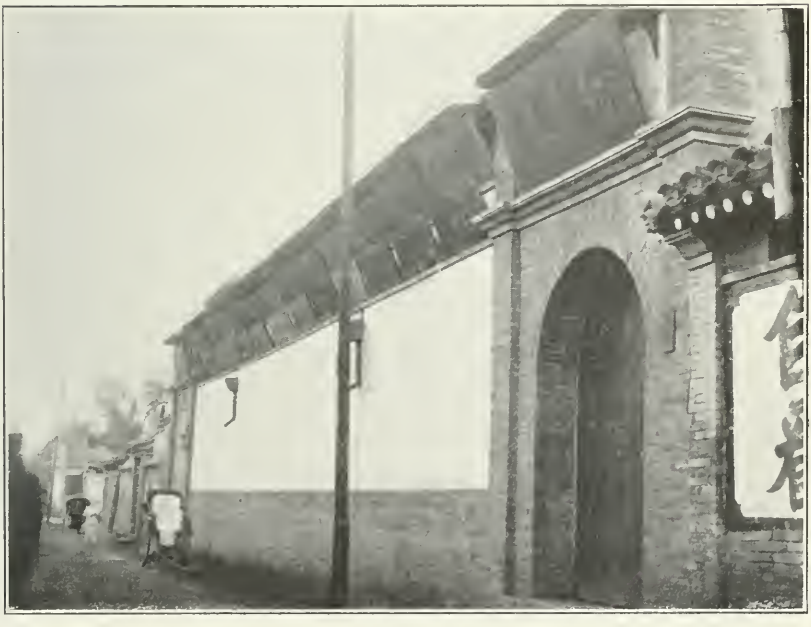


Fig. 2.—The residences of well-to-do physicians are marked by a display of testimonial tablets from grateful patients.

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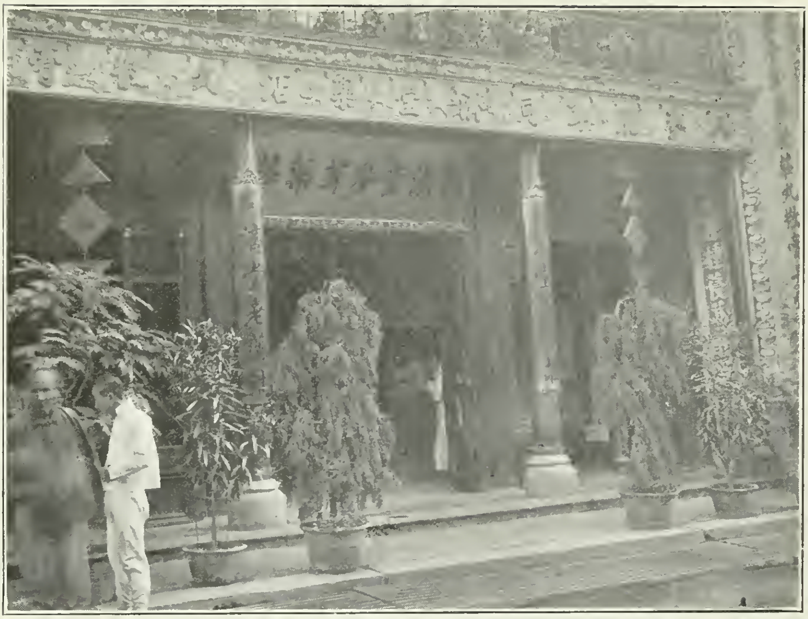

Fig 3.—At a very famous store in Peking established about three hundred years ago, they claim to sell one thousand dollars' worth of native drugs a day.

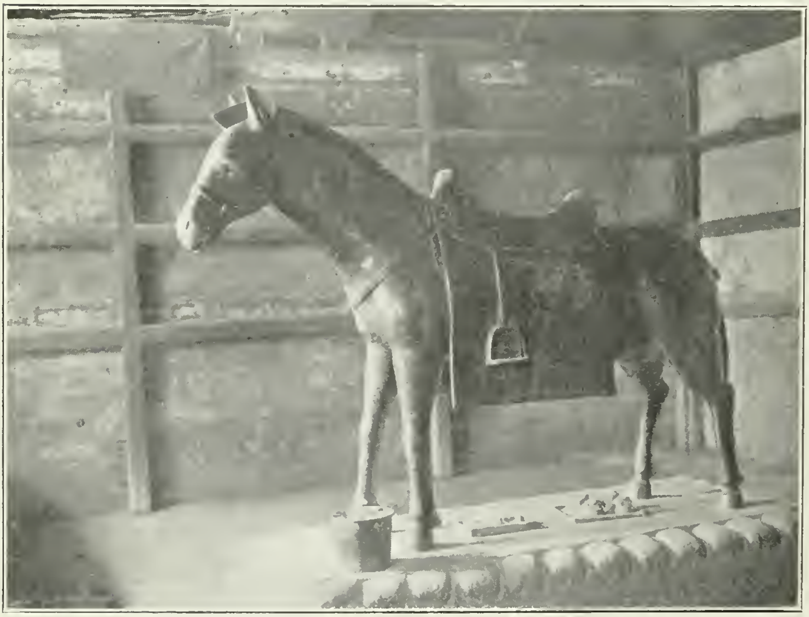

Fig. 4.—The male mule of brass is the most venerated. After making a small contribution to the priest and suitable obeisance the faithful draw near and rub the part that ails them and then the corresponding part of the mule.

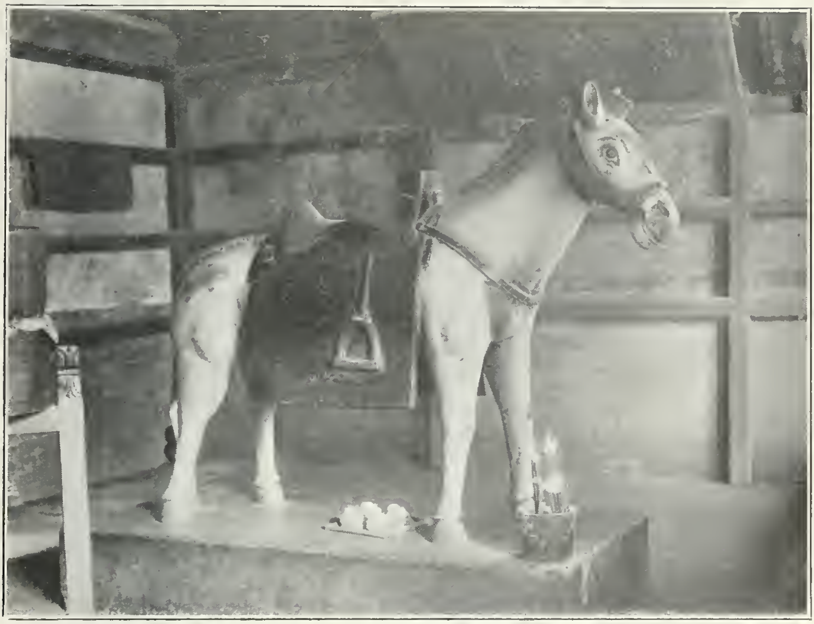

Fig. 5.—The female mule is used in the same way by women (see Fig. 4).

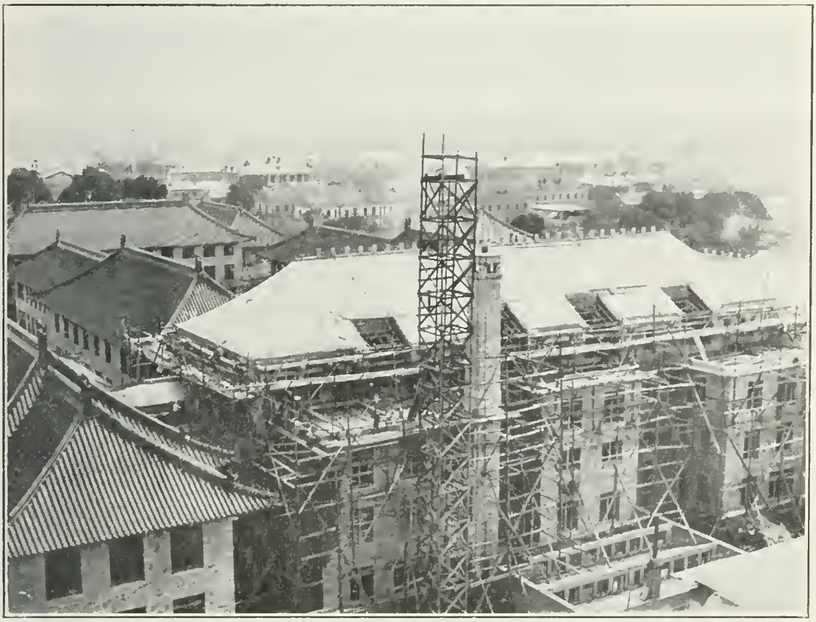

Fig. 6.—The China Medical Board has spent about $7,000,000 on the buildings of the Peking Union Medical College, in which the best type of Chinese architecture is combined with the highest efficiency.

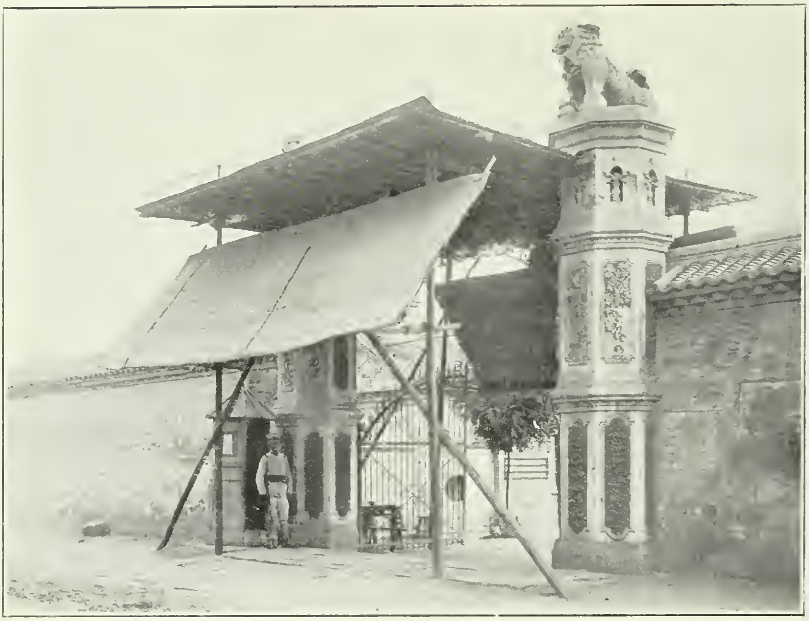

Fig. 7.—Military discipline is maintained at the Army Medical School as indicated by the guard at the entrance.

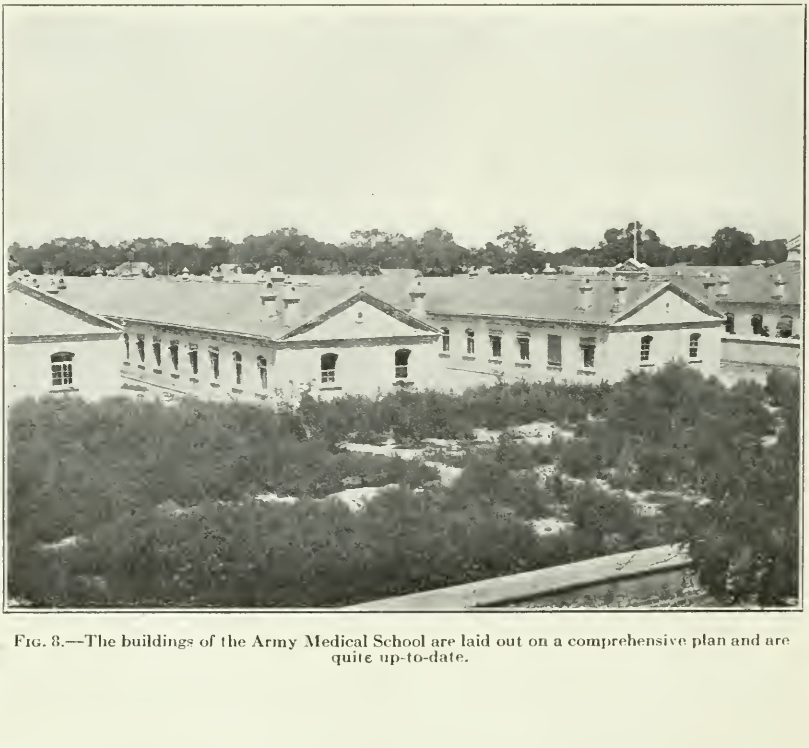

Fig. 8.—The buildings of the Army Medical School are laid out on a comprehensive plan and are quite up-to-date.

us. Many characters must be studied and the aggregate results carefully weighed before we can venture any opinion regarding the potentialities of the Yellow Race. The gradual reduction in the vermiform appendix in the course of evolution seems to be a progressive characteristic. If, on investigation, we should find that it is relatively larger in the Chinese, we would say that in this respect the Chinese are of a more primitive and lower type. Take also the question of the relative size of the brain. If it should prove to be larger in the Chinese than in Occidentals, it would be safe to conclude that in this respect it is we who are the more primitive. As evolution goes on, the size of the head at birth is increasing so that more and more attention is being given to the pelvic outlet. A general increase of one-half an inch in its diameter would obviously bring about a great increase in the birth-rate. Unfortunately, no detailed measurements on a sufficiently large scale have yet been made, but it is an interesting thought that if the Chinese have our advantage in this respect, they will probably in time people the world.

The question of racial intermarriage is one of the great problems of our time. It should also be considered from every angle by skilled anthropologists with liberal support. The social ostracism which is at present accorded Eurasians is most distressing particularly in the Orient. If it is found that the results of intermarriage are, on the whole, not definitely detrimental to the individuals themselves, to their offspring, or to the community at large then we must curb the feeling of racial intolerance and see that justice is done.

A REPORT OF NERVE INJURIES CARED FOR AT EVACUATION HOSPITAL NO. 8, A. E. F.

By Lieutenant ADOLPH M. HANSON
Medical Corps, United States Army

THIS report includes all nerve injuries cared for at Evacuation Hospital No. 8, from June 6, 1918, to and including November 12, 1918. The cases have been classified as complete, if the nerve was completely severed, as incomplete, if partially severed, and as slight, if only grazed or contused.

Total number recorded and reported to the Surgeon General U. S. Army	90

CERVICAL PLEXUS 1.1 PER CENT OF TOTAL

Complete	1
Incomplete	0
Slight	0
Total	1

BRACHIAL PLEXUS 5.5 PER CENT OF TOTAL

Complete	3
Incomplete	2
Slight	0
Total	5

MEDIAN 18.8 PER CENT OF TOTAL

Complete	12
Incomplete	3
Slight	1
Right Complete and Left Incomplete	1
Total	17

ULNAR 15.5 PER CENT OF TOTAL

Complete	6
Incomplete	7
Slight	1
Total	14

MEDIAN AND ULNAR 4.4 PER CENT OF TOTAL

Complete	3
Incomplete	1
Slight	
Total	

MUSCULO-SPIRAL 23.3 PER CENT OF TOTAL

Complete	17
Incomplete	4
Slight	1
Total	22

MUSCULO-SPIRAL AND ULNAR 1.1 PER CENT OF TOTAL

Complete	1
Incomplete	0
Slight	0
Total	1

MUSCULO-SPIRAL, ULNAR, AND MUSCULO-CUTANEOUS 1.1 PER CENT OF TOTAL

Complete	1
Incomplete	0
Slight	0
Total	1

RADIAL 2.2 PER CENT OF TOTAL

Complete	2
Incomplete	0
Slight	0
Total	2

INTERNAL CUTANEOUS 3.3 PER CENT OF TOTAL

Complete	2
Incomplete	1
Slight	0
Total	3

SCIATIC 15.5 PER CENT OF TOTAL

Complete	7
Incomplete	6
Slight	1
Total	14

POPLITEAL 3.3 PER CENT OF TOTAL

Complete	2
Incomplete	0
Slight	1
Total	3

INTERNAL AND EXTERNAL POPLITEAL 1.1 PER CENT OF TOTAL

Complete	1
Incomplete	0
Slight	0
Total	1

PERONEAL 2.2 PER CENT OF TOTAL

Complete	2
Incomplete	0
Slight	0
Total	2

CLINICAL CLASSIFICATION

Complete severance	60
Partial severance	24
Slight injury	6

It will be noted in looking over the tabulated cases that the nerves in reference to those most frequently involved mentioned in their order respectively are: musculospiral, median, ulnar, sciatic, median and ulnar, popliteal, internal cutaneous, peroneal, etc. No attempt was made to properly suture the nerves that were completely severed. The severed ends were simply united by a single silk suture when possible to approximate the edges without too much tension.

These cases were collected from the records of the general debridement operations and were cared for by the general operating teams.

During February and March, 1919, I was temporarily attached to the Neuro-Surgical Department of U. S. A. General Hospital No. 29, at Fort Snelling, Minnesota, and while there the following number of nerve injuries came under my observation.

		Per Cent
7th Cranial	1	
Brachial Plexus	3	3.6
Circumflex	1	
Median	11	13.4
Musculo-spiral	19	23.2
Ulnar	10	12.2
Median and Ulnar	8	9.7
Lumbar Plexus	1	
Anterior Crural	1	
Sciatic	5	6.9
Internal Popliteal	2	
External Popliteal	18	21.9
Internal and External Popliteal	2	
Total	82	
Number of wounds healed	69	
Number of wounds not healed	13	

CLINICAL CLASSIFICATION

Complete Interruption	36
Partial Interruption	41
Irritative	5

PRESENT CONDITION

(*March* 19, 1919)

Stationary	50
Recovering	32
Cases which will not require operation	32
Cases where operation is positively indicated	19
Cases where operation is a possibility	31

The following number of cases were supplied with splints:

Musculo-spiral	19
Ulnar	2
External Popliteal	18
Sciatic	2

In the series cared for at Evacuation Hospital No. 8 the percentage of musculo-spiral injuries was 23.3, and the percentage of lesions of the same nerve at U. S. A. General Hospital No. 29 was 23.2. The nerves in the last mentioned series in their order relative to the number affected were: musculo-spiral, external popliteal, median, ulnar, median and ulnar, sciatic, etc. The comparison of the one series with the other is sufficiently striking to be of interest.

RECENT CONSIDERATIONS IN THE MANAGEMENT OF FRACTURES

By C. HOWARD MOORE, M.D.
Philadelphia, Pa., late Major, M. C., U. S. Army, Chief of Orthopedic Service, Evacuation Hospital 27

AND

ALAN DE F. SMITH, A.B., M.D., *New York City, late Major, M. C., U. S. Army, Senior Consultant in Orthopedic Surgery, Third Army.*

THE opportunity to demonstrate in a series of approximately 1,400 fractures the applicability of methods largely developed during the war to cases of the type seen in civil life, is the principal reason for this paper. The establishment of the Third Army in Germany immediately after the armistice in November, 1918, afforded this opportunity. Although during the active period of the war and for some time thereafter very large fracture centers were established by both the British and American armies, these were occupied almost entirely by cases of gunshot fracture not of the type commonly seen in civil life. The few Allied soldiers who had been wounded and were prisoners of war in Germany were promptly evacuated when the Third Army took over its sector of the occupied territory. The cases subsequently received were of the kind commonly met with in civil practice.

The distance of the Third Army from the hospital centers in France and its own excellent hospital facilities made it necessary and advisable to treat these cases for a considerable length of time in the Army area, until they could be returned to duty or evacuated. The credit for much of the early organization of this service is due to Col. William Darrach, senior consultant in surgery, Third Army, and Maj. Frank Dickson, senior consultant in orthopedic surgery, Third Army, until February, 1919. Much valuable assistance was received from Maj. James Harrington, chief of surgical service, Evacuation Hospital 27.

The collection of all fracture cases in two hospitals gave a graphic impression of the large number of accidents occuring in the Army area and caused much surprise that there should be so many casualties in an army under peace-time conditions. During April, 1919, there were admitted to Evacuation Hospital 27, Coblenz, the principal fracture center for the Army, 187 cases of fracture and 11 cases of dislocation; during May, 236 fractures and 1 dislocation; during June, 216 fractures and 3 dislocations. All other cases of fracture or dislocation were treated at Evacuation Hospital 16 at Trier, where the number of admissions was somewhat less than half that at Coblenz. This means that during May and June more than 300 cases of fracture occurred in the Third Army monthly. The average census of the Army at this time was less than 250,000. Thus the incidence of fractures was more than 0.1 per cent per month, or about 1.5 per cent annually.

Some light was shed upon the cause of these injuries by an analysis of 414 cases treated in the fracture center at Coblenz from January 1 to March 10, 1919. These consisted of 275 cases of fracture, with fractures of 326 bones; 124 cases of sprain and 15 cases of dislocation. Thirty cases of fracture or 10 per cent, were compound. Forty-five cases, or 16 per cent, had fractures of more than one bone. The small number of cases of sprain as compared with that of fractures probably was due to the fact that many less serious cases of the former were treated at this time in quarters or division hospitals.

The general etiology of 358 cases, including 243 fractures and 115 dislocations and sprains, of which sufficient data were obtainable, was as follows:

Cause	Number	Per cent
Athletics	82	22.8
Football	20	....
Wrestling	20	....
Boxing	8	....
Baseball	7	....
Basket ball	5	....
Miscellaneous	22	....
Motor vehicles	76	21.2
Cranking cars	24	....
Motorcycle accidents	20	....
Other accidents	32	....
Falls	64	17.8
Horses and Mules	45	12.5
Firearms	11	3.0
Other causes	80	22.3

It thus appears that of this series of 358 cases the largest group were caused by athletics. A further analysis would show, however, that these cases were among the least serious. The part played by various sports was influenced largely by the season (winter), and an analysis for the entire year undoubtedly would show a different distribution. By far the most serious group of injuries of any size was that due to motor vehicle accidents. This group comprised 21.2 per cent of the total as compared with 22.8 per cent caused by athletics, but in point of fatality, permanent disability and suffering there is no comparison between the two. Added to the former group should also be a number of cases of instant death. The injuries from motorcycle accidents in particular were very severe, accounting for many of the most serious cases of multiple and compound fractures.

Gunshot fractures were comparatively few in number but were all severe. These as well as the group just described were for the most part due to carelessness and were preventable. An effort was made by propaganda to check these injuries, but without marked success.

The distribution of fractures in a series of 917 cases was as follows:

Bone	Number	Per cent
Clavicle	54	5.9
Scapula	10	1.1
Humerus	38	4.1
Radius	132	14.4
Ulna	26	2.8
Radius and ulna	42	4.6
Carpal	40	4.3
Metacarpal	50	5.4
Phalanges (hand)	21	2.3
Ribs	10	1.1
Pelvis	16	1.7
Femur	33	3.6
Patella	18	1.9
Tibia	65	7.0
Fibula	146	15.9
Tibia and fibula	95	10.3
Tarsal	28	3.1
Metatarsal	54	5.9
Phalanges (foot)	17	1.8
Vertebrae	22	2.4

These proportions were quite constant each month for the period over which they were taken. They naturally are representative only of the conditions under which they occurred and show the distribution to be expected in cases of young adult males. Fractures of the cranium and face, which were not treated on this service, are not included. Most cases of fractured ribs were treated in quarters, which accounts for their absence from the table. Attention is called by Colonel Darrach to the much greater frequency of carpal fractures in this series than in any hitherto published. In Stimson's[1] series of 14,566 cases these injuries represented 0.1 per cent, and in Speed's[2] series of 10,802 cases, 0.2 per cent. It is believed that our figures represent the average more accurately and that these fractures are much more common than previously has been supposed.

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[1] Stimson, L. A.: A Practical Treatise on Fractures and Dislocations, 7th edition, 1912, 20.

[2] Speed, Kellogg: A Text Book of Fractures and Dislocations, 1916, 517.

At first fractures and dislocations were treated in five of the evacuation hospitals. It at once became apparent, however, that many considerations made advisable the concentration of these cases in the fewest possible places. The nature of the Army area made Coblenz and Trier the two desirable centers. The concentration of these patients in two hospitals created advantages that were very evident to all who were able to compare the old and new systems. This experience simply emphasizes the truth of what has been stated by Sir Robert Jones,[3] Sir Anthony Bowlby,[4] and others familiar with the problem of handling large numbers of fractures, that the fullest degree of coöperation and attainment of success can be accomplished in time of peace as well as in war, only by the concentration of cases and creation of special services.[5]

The proper splinting and immediate evacuation of all fractures to the nearest center were insisted upon because of our belief that every case should be regarded as an emergency and treated without delay.

The principal orthopedic service of the Army was established at Coblenz in the buildings of a German military hospital which had been completed shortly before the beginning of the war. This hospital also housed the surgical service. The buildings, unusually well constructed and equipped, were surpassed by those of few modern hospitals anywhere. The orthopedic service finally was expanded to about 330 beds including splendid wards, and in addition convalescent barracks in which were treated ambulatory cases requiring less careful supervision than the others. Each group of two wards had a plaster room.

A part of the original equipment of the hospital was a very complete electro- and hydro-therapy department and a room filled with Zander apparatus. The electro- and hydro-therapy departments were continued under the operation of German civilians, and were very useful.

The most essential factor in the after treatment of these cases, however, was the establishment of a physio and occupational therapy department maintained by reconstruction aides. Massage and early active movement were considered essential in the treatment of all fractures. In addition to affording much needed diversion to bed cases, the occupational therapy department also administered actual therapeutic work. It was considered by the writers that a shop in which patients could turn out interesting work while at the same time performing some movement which was curative would be far more effective than a group of apparatus of the Zander type, which accomplished its ends passively. For this reason the Zander room was dismantled and converted into a curative work shop.[6] The scope of these departments may be seen from the typical report for May, in which it appears that 182 patients received 1,843 hydro and electro therapeutic treatments; 344 patients received 2,901 physio-therapeutic treatments consisting principally of massage; and 309 patients received occupational therapy either in wards or in the shop.

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[3] Jones, R.: Joint, Nerve and Other Injuries in War Surgery. Surgery, Gynecology and Obstetrics, 1920, xxx, 1, 1.

[4] Bowlby, A.: Care of the Wounded Man in War. Surgery, Gynecology and Obstetrics, 1920. xxx, 1, 13.

[5] The Massachusetts General Hospital in Boston already has recognized the truth of this principle to the extent of segregating all its fracture cases on a special service.

The equipment included a Hawley fracture table and the regulation army splints and appliances.[7] It was with these, together with plaster, that all the work was done.

An emergency X-ray was taken of every case of suspected fracture on admssion regardless of the time of day or night. The portable X-ray was used extensively in the wards to check up the position of fractures and was employed very largely with the fluoroscopic hood in the reduction of fractures. Radiograms of each case were kept at the bedside in an envelope, an arrangement which facilitated greatly the treatment of cases.

A splendidly equipped operating room was reserved especially for clean bone cases. This had a permanent personnel, insuring the team work between surgeons and nurses so necessary for the proper carrying out of the Lane technic.

The basic principles upon which we treated our cases were formulated by Colonel Darrach. They were:

1. Incomplete fractures and fractures without displacement require protection only.

2. Transverse fractures and those with digitation of the fragments which can be made to hold their position after reduction, require reduction and retention, the latter usually by plaster.

3. Spiral and oblique fractures and others of such a nature that the fragments will not stay reduced, as well as compound fractures, require treatment by traction.

4. A certain small group of cases which cannot be treated satisfactorily by the foregoing means need to be operated upon. In these

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[6] The improvement in the morale of the patients following the establishment of the workshod and the bedside work was very striking. It is felt that such a department is most desirable in every hospital. Among others, Bellevue Hospital, New York, has established a curative workshop.

[7] Manual of Splints and Appliances for the Use of the Medical Department of the United States Army. Second edition, 1981.

reduction and retention should be accomplished as far as possible without the introduction of foreign bodies.

5. Compound fractures, if the wound is small, are in some cases treated as simple fractures. Otherwise the wounds are debrided as thoroughly as possible and, provided too great a time has not elapsed, closed by primary or delayed primary suture. If this is not advisable Carrell treatment is instituted and secondary suture accomplished later if possible.

6. In all fractures early reduction or other treatment is essential, for the reason that repair begins so promptly that a difference of 36 or 48 hours may make vastly more difficult or impossible the desired end. For this reason it is believed that in cases where traction is relied upon to effect, as well as maintain, reduction the maximum amount of weight should be applied at once, rather than a gradual increase over a period of several days, as is frequently practiced. It is felt that in from five days to a week repair has progressed to an extent that may make reduction impossible if it has not already been accomplished.[8]

7. Each fracture should be immobilized for as short a time as possible. Active movement of the adjacent joints and massage of the part should be started as soon as feasible. Active movements are favored rather than passive and the practice of "breaking up adhesions" in a stiff joint is discountenanced.

In all cases of simple transverse fracture of the femur a thorough attempt was made to accomplish reduction, using for this purpose the Hawley table. By employing the fluoroscope the operator was enabled actually to see the fragments during the manipulation. In several cases end-to-end reduction was accomplished and maintained. In others, in which either the position was not maintained after reduction or in which reduction was prevented by muscular interposition, an operation was performed and a Lane plate inserted. Instruments for performing a bone graft were not available. There were no infections in these cases.

Spiral and oblique fractures of the shaft of the femur were treated in Thomas splints suspended from Lyle[9] overhead frames. Running traction over a pully at the foot of the bed was used rather than dead traction by means of the Spanish windlass. As a rule, traction bands were applied to the surface, and after trials with glue and celluloid-acetone solution, adhesive plaster was adopted as the most satisfactory material. Moleskin plaster was not obtainable. In difficult cases and in all cases of fracture in the lower third, ice tongs were used. They were very successful in holding the fragments and were of great value in cases where extensive skin destruction made surface traction impossible. Several slight infections occurred around the tongs, but none with serious consequences.

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[8] The theory that the early contracture of muscles is an obstacle to late reduction also has been advanced.

[9] Lyle, H. H. M.: The Portable Suspension Frame Employed in the Treatment of the Wounded During the European War. Annals of Surgery, 1920, LXXXI, 6, 772.

It was found that cases of fracture of the femur, together with a psychosis from brain injury, which were very difficult to manage, were best controlled by using the Thomas splint with twister traction. This made it almost impossible for the patient to work out of the splint, a thing which occurred when the running traction was used in two of these cases. Plaster was not practicable in these cases because the patients were incontinent.

Transverse fractures of the humerus if possible were reduced under the fluoroscope and immobilized in plaster. For the other cases in which traction was indicated, the Blake[10] method of suspension and traction without splints was found the most satisfactory. All cases of fracture of the greater tuberosity of the humerus, of which there were a number complicating dislocation of the shoulder, were put up immediately in 90 degrees of abduction in an aeroplane splint. This was successful in avoiding the abduction contractures so common after this injury.

Colles's fractures were reduced and put up in plaster in a position of palmar flexion and ulnar rotation. The posterior half of the bandage was removed and massage started on the third day. Active movements were begun on the tenth day. As soon as practicable, sometimes as early as the second week, light work was begun in the curative shop. This series of cases was in many ways the most satisfactory of all. In the majority of cases from 30 to 40 degrees each of flexion and extension and from 40 to 50 degrees of pronation and supination were possible during the third week. Good power in the extensors and flexors of the fingers also was recovered early.

In cases of adduction and abduction fractures at the ankle massage was started at the end of the second week and as a rule weight bearing in a shoe with a Thomas heel was allowed by the fifth week.

This paper is submitted not so much with the purpose of presenting anything that is original in the treatment of these fractures as to urge the importance of the following points:

1. That the treatment of fractures by a combination of traction and suspension is of the greatest usefulness in cases of the civil type and

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[10] Blake, J. A.: Gunshot Fractures of the Extremities, 1918, 52.59.

is the method of choice in the great majority of fractures of the shaft of long bones.

2. The earliest possible reduction or other definitive treatment of a fracture is imperative, regardless of the amount of swelling or any other condition except shock.

3. That in any community where fractures occur in large numbers they can be treated most satisfactorily on special fracture services.

4. A standard equipment consisting of a few simple splints and accessories such as that adopted by the United States and British Armies leads to the most satisfactory results in the treatment of fractures received in civil life as well as in war.

5. Well equipped departments of hydro-and electro-therapy, physiotherapy, and occupational therapy are necessary auxiliaries of a fracture service.

6. The fullest coöperation between the surgeon and the radiologist is essential. A portable bedside X-ray equipment is necessary for the best treatment of fractures by the suspension and traction method.

THE RESULTS OF WOUND EXCISION WITH SUGGESTIONS AS TO IMPROVEMENTS AND ALTERNATIVE METHODS[1]

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(With six illustrations)

THE value of wound excision in saving life as well as important function was convincingly demonstrated to most medical officers during the World's war. An effort to improve the methods now in general use, the widespread introduction of this important principle in industrial surgery and fundamental instruction in wound excision to Medical Reserve Corps officers seem to deserve our present attention.

A study of results observed among our returned wounded and comparison with fourteen years' experience in civil life leads me to hope that some improvements in methods are possible. In American medical literature, the subject has been ably discussed by Baer, Dean Lewis, Poole and others, but its importance is great enough to deserve repetition. Wound excision should be far more widely practiced in industrial surgery than is at present the rule, and this will offer the best experience for surgeons who should form the Medical Reserve Corps in event of another war. Over ten years ago, I advocated wound excision in the treatment of Compound Fractures essentially as used during the late war, at a meeting of the New York State Medical Society and published a report of encouraging results in a small series of cases (New York State Journal of Medicine, May, 1909). This subject was also presented before King's County Medical Society, Brooklyn, and has been successfully used by some of its members. The method used was described as follows:

"First. Pack the wound with tampons of sterile cotton or gauze saturated with sterilized oil.

"Second. Scrub the surrounding skin thoroughly and prepare as for an aseptic operation. The oiled tampon and packing will prevent the bacteria which surely contaminate the scrub water, from penetrating into the wound.

"Third. After scrubbing thoroughly, and the use of antiseptic solutions for the surrounding skin, the oiled tampons should be removed. The oil can be removed by means of ether, gasoline or benzine swabs.

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[1] Read at annual meeting of the Association of Military Surgeons, New Orleans La., April 22-24, 1920.

The badly lacerated tissue should then be thoroughly swabbed with some powerful, certain germicide. It does not matter specially what germicide is used. Harrington's solution, pure carbolic acid, strong solutions of formalin may be used. The wound should be thoroughly swabbed and an effort made to reach the bottom of every pocket and to work the disinfectant well into the ragged and bruised tissue. Only important structures, such as main vessels or nerves should be avoided.

"Fourth. With knife or scissors, excise tissues damaged by injury or the germicide solution. It is of advantage to use a tourniquet during excision of damaged tissue, otherwise free flow of blood is apt to obscure our field and prevent thorough work.

"Fifth. The wound can usually be closed safely as an ordinary clean incised wound without drainage; for if our work has been thorough we are dealing with healthy tissue of good vitality."

During the intervening years, I have added to that experience in civil practice and have also had opportunity to observe the results in military surgery. At General Hospital No. 26, Ft. Des Moines, Iowa, in eight and one half months, beginning in August, 1918, several thousand war wounds were cared for. The exact number who had had wound excision is uncertain, for records were not available in many cases, but it is certain that it had been used with the great majority. The results as a whole were most favorable. Every surgeon of experience and knowledge of the usual results of such severe injuries in civil life was impressed with the great number of lives saved. The saving of limbs, and important function was no less remarkable. Great numbers of men whose bones the X-ray showed to have been shattered into numerous fragments recovered useful arms and legs, with slight if any deformity. Although there was considerable loss of soft parts in many cases, there was usually surprisingly good function of muscles, joints and tendons. Several had had successful nerve suture with early return of function. Moreover the healing had been rapid and relatively free from discomforts and complications and with a minimum amount of attention on the part of medical officers and nurses, and a minimum use of surgical supplies.

These satisfactory recoveries strongly contrasted with other injuries, frequently much less severe in which there was prolonged suppuration and great disability. When possible to give the wound early and suitable attention, the most frequent reasons for failure to obtain better results seems to be:

First. Incomplete excision of damaged and infected tissues. This was evident from the presence of fragments of projectile of considerable size in the wounds, pieces of clothing or most frequent of all, infection of bone which kept up prolonged suppuration.

Second. Apparently unnecessarily extensive excision attended by loss of function.

Third. The contamination of the clean cut areas of the wound during excision from the infected material which was being removed.

Fourth. Perhaps the most important cause of failure was an imperfect knowledge of surgical anatomy. This led to the sacrifice of important blood supply, nerves and tendons in some instances which seemed especially unfortunate.

In the future, these difficulties might be met in part at least. Incomplete excision of damaged and infected tissue was frequently unavoidable under conditions of stress at the front but under ordinary conditions would indicate careless or untrained work. All projectiles and many foreign bodies are readily shown by the X-ray and even without X-ray should be removed by careful excision, especially if efficient staining is used.

Bone infection is usually obstinate and is probably generally secondary to infection of the soft parts after imperfect excision. When the bone is definitely contaminated, excision of a superficial layer with rongeur, Liston cutting forceps or sometimes gouge, chisel or curet is indicated. It is rarely necessary to remove large fragments. Bone should not be left exposed if possible to cover by suturing over soft parts or plastic as the exposed area dies and wound infection almost inevitably results.

Extensive excision with loss of function was apparently frequently the result of imperfect understanding of the objects to be attained. Efficient staining and excision of a thin layer of tissue beyond the stained area is probably the best means of avoiding this source of failure.

Contamination of the clean cut areas during the removal of damaged tissue may be in large measure avoided by preliminary disinfection by swabbing with some active disinfectant before beginning excision and by careful skin preparation.

The sacrifice of important structures doubtless could have been largely avoided by a few weeks well directed intensive study of surgical anatomy. The value of such short courses of intensive study as were given many medical officers under the direction of the Surgeon General's office was clearly shown in all parts of the medical service and would undoubtedly have been more apparent had the war continued longer.

With the exception of tissue staining, most of these measures were emphasized in the article which I have quoted but they should be discussed more in detail.

Preliminary wound disinfection should not be considered as a substitute for wound excision.

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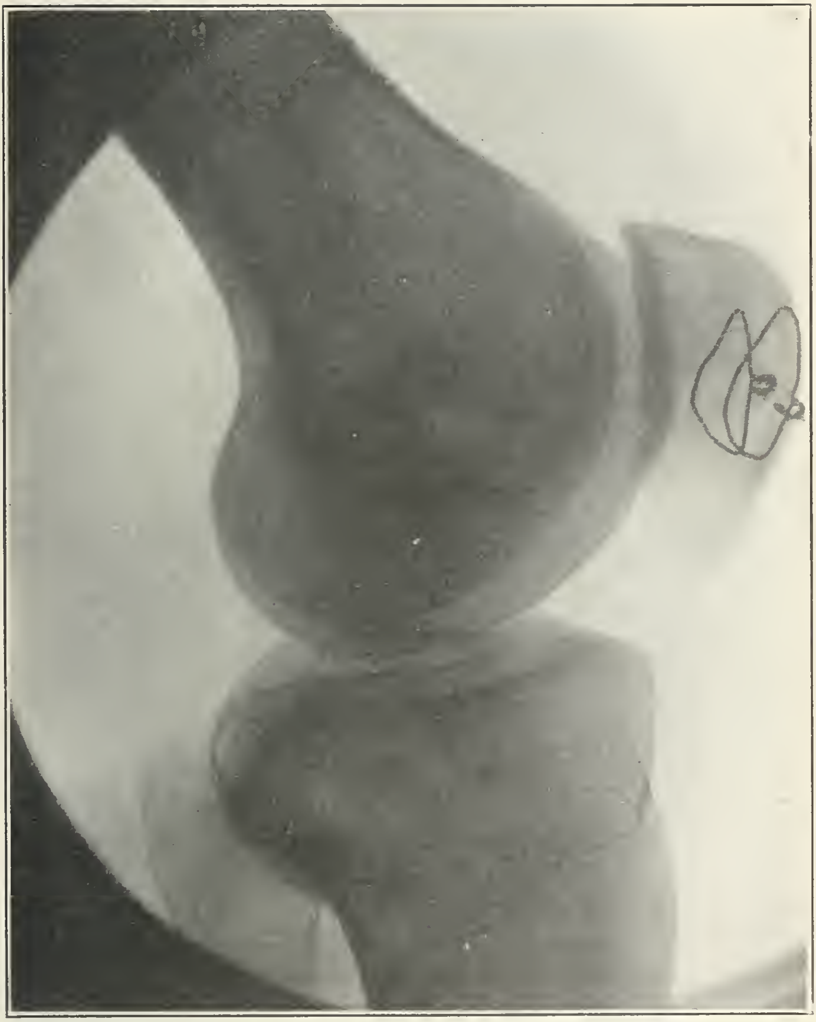

FIG. 1.—Wound excision operation performed 1905. Compound comminuted fracture of patella. Kicked in the knee by a horse. Wound contaminated with horse manure. No trouble from silver wire sutures 5 years after operation.

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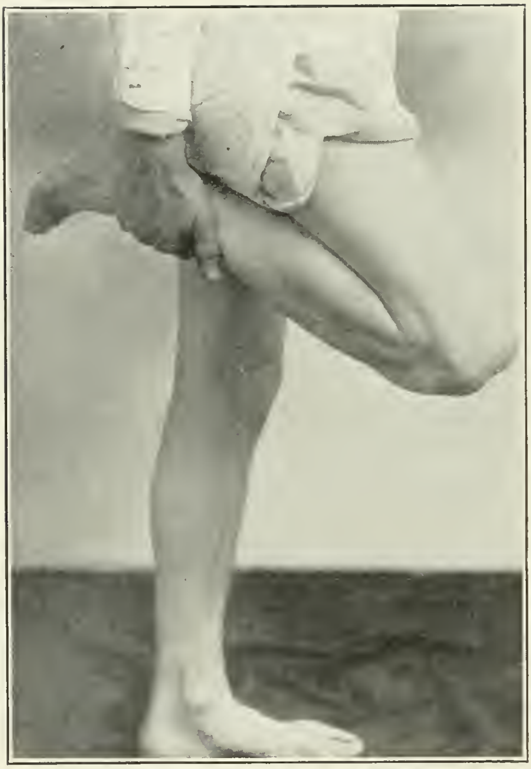

FIG. 2.—Perfect flexion of knee both voluntary and passive in fracture of patella, shown in Fig. 1. Patient able to do all kinds of farm work without any disability.

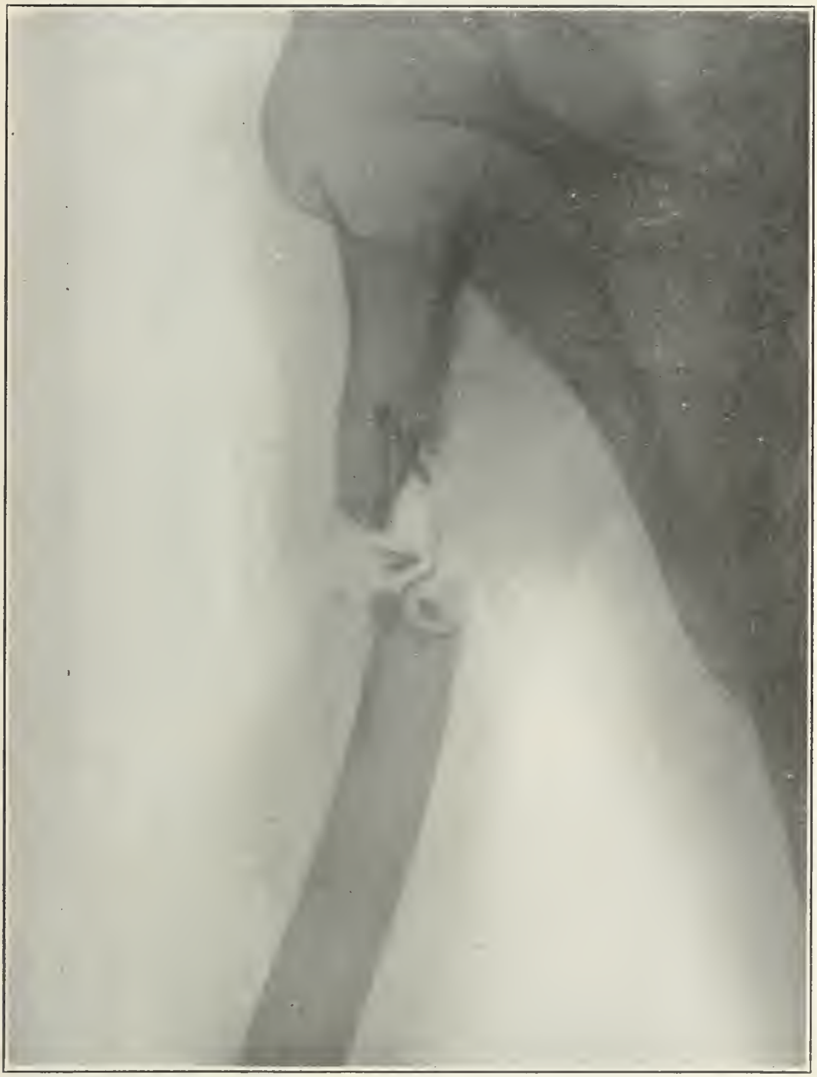

Fig. 3.—Compound communited fracture of humerus. Arm run over by freight car and bone crushed into minute fragments over width of car wheel. Attempt to suture with silver wire unsuccessful but wires caused no trouble. Bone grafting refused.

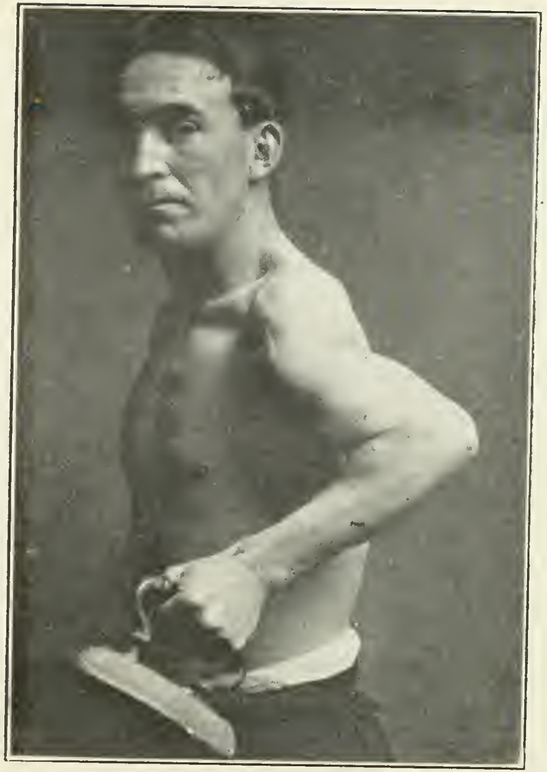

Fig. 4.—Functional result after injury shown in Fig. 3. Flail-joint weakens arm but patient is able to work as freight conductor.

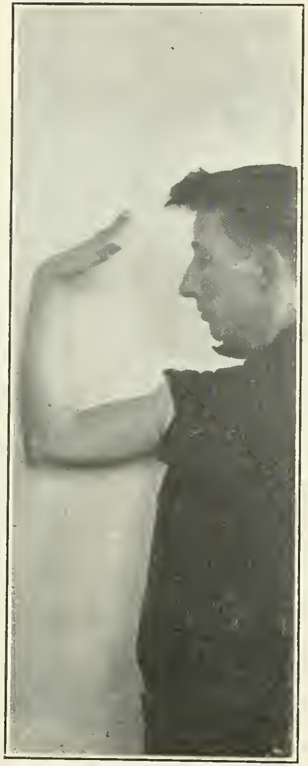

Fig. 5.—Illustrating importance of dealing with wounds of soft parts in case of compound fractures. Patient had a bad compound communited fracture following kick by Army mule. Complete paralysis of musculospiral nerve which was caught over a small spur of bone in the callus. Patient had complete voluntary extension of the wrist and fingers three months after freeing nerve.

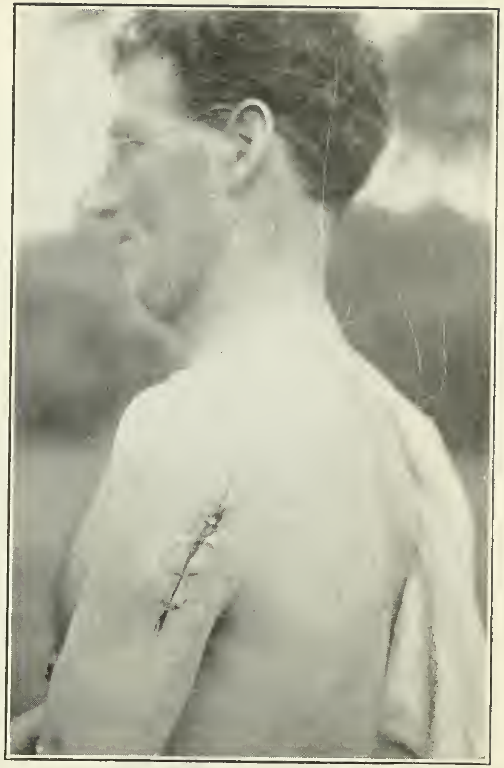

Fig. 6.—Shrapnel wound of shoulder, extensive deep laceration of muscles down the humerus, scapula and shoulder joint. Numerous tetanus bacilli from cultures taken from the depths of the wound. Treated by tetanus anti-toxin; injection of saturated permanganate of potassium solution to outline damaged tissues; wound excision followed by Carrel-Dakin technique and secondary wound suture when smears showed one bacterium to five fields.

The important objects of wound excision are two: (a) removal of infection and (b) removal of tissue damaged beyond possible repair. Preliminary disinfection helps only in the first of these almost equally important objects.

The use of any one of several strong penetrating antiseptics will render the wound bacteria free in a few cases and will greatly reduce the numbers of infectious organisms in all cases if properly used. It does not appreciably add to the destruction of tissue caused by severe laceration and contusion and it greatly lessens the chance of smearing infection into the freshly excised area. The combination of a stain with the disinfectant makes it possible to outline the damaged tissue much more accurately and still further lessens chances of smearing.

Tissue damaged beyond repair must slough and even under sterile conditions this is a tedious process. If ever so little infection is present, the eventual involvement of the entire wound is inevitable, with all the dangers of sepsis, long delay in healing, much labor for attendants, unlimited surgical supplies and worst of all suffering and disability from scar tissue for the patient.

With the very evident advantages of preliminary disinfection and staining, it seems strange that they have not been more generally used.

Staining the Tissues.—It is impossible to tell what tissues in a lacerated wound are contaminated and what are not. It is also impossible to outline an irregular wound unless some method of staining is employed. The use of a staining solution consumes very little time and is more than compensated in the accuracy and rapidity with which excision can be done. The combination of a stain with a strong disinfectant accomplishes both purposes at one time. In large open lacerated wounds, gauze saturated with the solution and packed loosely into the wound for a few seconds accomplishes the purpose. It is sometimes desirable to swab with the stain and strong antiseptic. In penetrating and perforating wounds, the solution is best injected, taking care to avoid pressure which might force the fluid between muscle planes and along tendon sheaths. Unless some method of staining and outlining the tissues is used, it is frequently difficult or impossible to outline an irregular lacerated and contused wound and to find its deep recesses. Of course, in certain instances, deep pockets may escape staining but it is surprising to see how well and clearly very irregular tracts are outlined in most cases. Where there is only a relatively small wound of entrance with extensive destruction of soft parts in the depths of the wound, it is necessary to enlarge the external wound by a skin incision. While it is also sometimes necessary to enlarge the wound by cutting through muscles and fascia, transverse cuts across muscles, tendons or aponeuroses are of course to be avoided, if possible.

A number of stains outline satisfactorily the average lacerated and contused wound and not all of these are dyes. In many cases where there is a small wound of entrance, the injection of hot permanganate of potassium saturated solution is very satisfactory; it will stain the damaged tissues a deep black, showing the limit of excision quite clearly. The fact that permanganate of potassium is an active oxidizing agent should add to its value in case anaerobic bacteria are present. My attention was first called to the value of hot permanganate of potassium in outlining irregular sinuses and fistulae by Lieut. Col. B. F. Alden of San Francisco. Probably the iodine carbolic preparation suggested by the United States Pharmacopeia would answer well and might appeal to those who have a good deal of confidence in the antiseptic value of iodine. It consists of iodine and glycerin 20 parts each and pure carbolic crystals 60 parts. It is doubtful if the iodine adds materially to the antiseptic properties of this combination as pure carbolic acid has long been known to kill the most resistent spore forming bacteria almost instantly. The anilin dyes have certain antiseptic value and can be combined with Harrington's solution, formaldehyd or carbolic acid. Methylene blue has been used for a number of years as a mild antiseptic. Pyoktanin which has been used in preparing antiseptic catgut also makes a good stain for wound excision. During the war, certain British surgeons attributed great value to flavine and acriflavine, but tests which were used in the War Demonstration Hospital of the Rockefeller Institute did not show that these stains had very great antiseptic value. There is probably very little choice as to which of these dyes are used and any of them are doubtless somewhat antiseptic as well as good stains. Personally I prefer the pure carbolic acid with aniline dye if available.

Protection from Contamination.—Thorough preparation of the skin surrounding the wound, the removal of gross dirt, shaving and scrubbing with soap and water are of far more value than swabbing the skin with quantities of iodine or the introduction of flavine or *bipp* or even Dakin's solution in the wound. In cleaning up the surrounding skin, it is important to protect the wound from further contamination by the scrub water and other materials used. Tamponing the wound with gauze or cotton saturated in oil as I originally suggested consumes very little time and is effectual enough to well warrant the trouble. Probably other methods of prevention of contamination might do as well or possibly better, but thus far this is all that I have personally tried. There can be little doubt but that the scrubbing of the surrounding skin and the wound itself as was formerly frequently done, has done more harm than good by carrying infectious material into the deeper parts of the wound.

Use of Tourniquet.—In wounds of the extremities, the use of the tourniquet is of great advantage. In some cases and in certain parts of the body, the free bleeding so obscures the field as to make it difficult to determine what should be the limit of excision. If the wound is well stained, the length of time consumed in excision need not be so very great in most cases and I have yet to see any pressure paralysis which could be credited to the use of the tourniquet. It seems especially important in working in the vicinity of large vessels and nerves.

Combination of Plastic Measures with Wound Excision.—In many cases, a great deal of time in healing could be saved for patients and valuable function conserved by plastic surgery at the time of wound excision. Everyone who has had experience understands how quickly a tendon becomes necrotic if exposed. Five minutes additional time would frequently suffice to cover in exposed tendons by use of a pedicle flap, and another five minutes would cover the area from which the flap was taken with skin grafts. Usually flaps can be turned without danger to the area from which they are taken. In certain cases, it might even be desirable to attach a pedicle flap from the chest or abdomen. Where important nerves or tendons are exposed the insertion of a fat graft underneath them and covering them with a pedicle skin flap would often prevent adhesion and preserve function. In our work at General Hospital No. 26, it was several times necessary to open wounds in which fat had been grafted and we found at these secondary operations that the transplanted fat persisted and accomplished its purpose of preventing adhesion and compression by scar tissue. In transplanting fat in the neighborhood of tendons or nerves, my own choice would be for fat taken from parts of the body where there is little admixture with white fibrous tissue. The fat in the region of the breast on the chest has fine lobules and little white fibrous tissue, whereas fat from the outer surface of the thigh, buttocks and many other parts of the body contains a great deal of white fibrous tissue which might perhaps form scar tissue later.

Immediate nerve suture should be done in every case where it is possible when an important nerve is divided in the territory of a wound excision. Even where there is failure to get early restoration of function, the nerve almost always holds together in spite of suppuration, and secondary repair, if necessary, is made easier. We saw a considerable number of cases with satisfactory or returning function following immediate nerve suture, apparently a much larger percentage of satisfactory results than would be expected after secondary suture. A very imperfect nerve suture during a wound excision would be far better than none and would require little additional time.

Immediate suture of tendons is almost as important as nerve suture and is usually successful. In one of my cases a large gap was made in the tendons of the ring finger by a gunshot wound which completely destroyed it as well as the bone. Although there was a good deal of shortening, a strong, useful finger was saved by wound excision and immediate tendon suture. Whether circular suture of the large blood vessels would be commonly successful, it is difficult to say, but there will unquestionably be many cases in which it would be worth while to try it. I have used lateral suture of the larger arteries and veins with satisfactory results in a considerable number of cases. Fascial transplants could undoubtedly be successfully used in a good many wound excision cases to bridge defects in tendons which have been destroyed by injury. At General Hospital No. 26, Lieut. Howard L. Prince got good function with a fascial transplant to fill a defect of four inches in the quadriceps extensor tendon just above the patella. It seems possible that this might have been accomplished even more satisfactorily by an immediate fascial transplant at the time of wound excision. If a wound is doubtfully clean, a thin layer of muscle or fat may be sutured over important nerves or tendons, carrying Carrel-Dakin tubes down into the wound. We did this in treating cases in which there was latent infection in the wound because of foreign material having healed in and it would surely be even more satisfactory in wound excision.

In case of extensive laceration or crushing of the tissues to a pulp so that wound excision would mean the sacrifice of important function of an extremity some less radical alternative seems justifiable provided the main blood supply is not destroyed. Skin and wound disinfection should be used, with partial wound excision in some cases but without attempting complete excision and suture. The Carrel-Dakin method combined with partial excision and later plastic surgery would probably be the most efficient treatment for saving maximum useful function in most cases. In my earlier work, I used mild antiseptic dressings until a line of demarcation formed and found that this could be perfectly safely done. Nearly always more tissue lives than we expect and even if it all dies nothing has been lost but a little time. By careful use of rescued tissues every fraction of a useful extremity is saved and to most men an extra finger or part of the thumb is too valuable to be sacrificed.

In closing, I venture to say that it seems a duty and an opportunity for every man who has seen the splendid results of wound excision and many other important advances in military surgery, to spread this knowledge in civil life. If the best results are to be obtained; if fingers, hands, legs and arms are to be saved and stiff joints, contractures and paralyses are to be prevented, it is essential that in times of peace as well as war some of our best brains shall be devoted to severe wounds and compound fractures.

THE YEAR'S WORK IN MILITARY HOSPITALS AND A PROSPECTUS OF THE FUTURE[1]

By Major FLOYD KRAMER
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I

BEFORE beginning with the statement of the work in the military hospitals, it may be of advantage to state how the office is organized for work. If the mere enumeration of acts performed is of interest, then a few words in reference to how they are accomplished must be at least equally interesting; moreover, the year's work can be visualized more easily after a survey of office organization.

The Surgeon General's Office is divided into ten divisions, one of which, the Hospital Division, charged with the hospitalization of sick, is subdivided into the following four sections: Hospital, Surgical, Internal Medicine, and Physical Reconstruction. The Hospital Section is charged with the procurement of all hospital space in the United States and with the administration of all hospitals which are directly under the control of the War Department. Briefly, the Surgical, Internal Medicine and Physical Reconstruction Sections coöperate with the Hospital Section in conducting the professional work in the hospitals and handle all matters especially referable to those branches. The Hospital Section, in order to facilitate its work, is divided on functional lines into four subsections—Construction, Administration, Census, and Statistical. They are enumerated here in the natural order of their birth as well as in the order of their application, for it will be seen that administration cannot operate without previous hospital construction, that census and distribution of sick cannot take place without previous operation of a hospital, and that statistics and deductions cannot be made without the basis of preceding activity. These subsections cover all the activities of the Hospital Section and the short name given to each merely aims to state the keynote function.

During the past year there has been a great decrease in the amount of work done, both in the office and in the hospitals. Naturally, the decrease has been greater in the hospitals than in the central office. In this process of reduction there has been the inevitable tendency from a state of specialism and subdivision to one of general utility and consolidation, and this applies to administrative control as well as to operative personnel. The number of officers and assistants in control of this work in the office has diminished from 18 last year to 5 at the beginning of this fiscal year, and the personnel in the field has dropped from over 30,000 to less than 10,000. Construction and leasing work has been greatly reduced and the work of salvaging and cancellation has largely taken its place. Though the year has been a busy one for the reduced force in the office, the predominating feature, so far as the construction of hospitals is concerned, has been one of destruction instead of construction, and, with very few exceptions, all that remains is an agglutination here and there of temporary buildings—the evidence of the lack of vision in a peaceful nation.

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[1] Read before the "American Conference on Hospital Service," Montreal, Quebec, Oct. 15, 1920.

Before giving a review of the year's work in the hospitals, and in order that it may be more clearly presented, it is well to show the hospital situation as it stood a year ago. (See Table 1.) At that time there were in operation 30 general hospitals with a total organized capacity of 35,000 beds; 17 large base hospitals with an organized capacity of 16,000 beds; and 8 debarkation hospitals at the ports of embarkation with an organized capacity of 12,000 beds; making a total of 55 hospitals under the direct control of the office with a total organized capacity of 64,000 beds and 40,000 sick under treatment. These figures are given in round numbers only. They do not include the sick in small hospitals and, therefore, do not represent the total sick of the Army. So much for one year ago.

In order that a proper view may be gained of the work accomplished during the year in these hospitals and that comparison may be made, not only with the greater work done in the preceding year, but also with the lesser amount for the coming year, the hospital situation at present will be briefly presented. (See Table 2.) There are remaining no port hospitals, nor base hospitals, but only 8 general hospitals with a total organized capacity of 7,000 beds and 5,000 cases under treatment, 36 hospitals having been either abandoned, salvaged or converted. And, bringing the situation actually up to date (Oct. 15), two of these general hospitals were converted on October 1 into smaller Station Hospitals, while two more at this moment are being turned over to the Public Health Service, leaving but four general hospitals in operation, as follows: The Walter Reed General Hospital, at Washington, D. C.; the Letterman, at San Francisco; the Fitzsimons, at Denver; and the Army and Navy, at Hot Springs, Ark.; and one, the Wm. Beaumont General Hospital, at El Paso, Tex., under construction. Exclusive of several thousand unimportant cases, over 50,000 sick were treated during the year in the general hospitals. Of these the majority have received definitive treatment and have been released from military control. This number is less, of course, than that for the preceding year, but during this year the cases treated were of a graver or more chronic character.

This short paper does not permit of an adequate review of the professional work done during the year. A brief résumé touching only the more interesting points will be attempted.

The surgical services have been particularly active and over 32,000 operations were performed. Of the major operations the majority were bone cases and of these osteomyelitis predominated. There were 419 amputations, 3,900 bone and joint operations and over 1,300 men were fitted with artificial appliances, 113 for the arm and 1,207 for the leg.

The evil inheritance from the epidemics of influenza, at least so far as empyema is concerned, has been reduced from 649 cases a year ago to 97 today, and 687 major operations of record for this and other respiratory complications bear witness to the efforts to cure and the will to recover. With the discharge of the cured and with the reduction in the number of hospitals there has come about a collection of surgical dregs, the like of which has never been seen—a concentration of difficult complicated cases of low resisting power, many of whom have been operated upon repeatedly. In handling these cases mature judgment and fine skill has been shown by those on the surgical services and the close cooperation of the other professional services has made possible the most gratifying results. There is much still to be done. In July there remained on the surgical services about 2,500 cases, of which one-third may be classed as general surgical and the other two-thirds divided between fractures, osteomyelitis, peripheral nerve injuries, empyema, maxillo-facial injuries and amputations. (See Table 3.)

The activities of the year under the head of Internal Medicine have had to do mainly with the care and disposition of tuberculous and neuro-psychiatric patients. A year ago over 4,000 cases of tuberculosis were under treatment; today there are less than 1,000. During the year over 2,000 new cases were admitted, the majority of whom came from the A. E. F. and of the total number 359 proved not to be manifest or clinical tuberculosis; 425 cases of manifest tuberculosis on admission were returned to duty within the year. Over 4,000 were discharged on certificate of disability, and of this number over half had attained the maximum amount of improvement. The anactment of the Sweet Bill, which provided a compensation for discharged, disabled soldiers, which was greatly in excess of their maximum active service pay, was responsible for this exodus from the military hospitals to a civilian status.

Over 96,000 men were rejected during the war on account of tuberculosis. Since last January comparatively few cases of the disease have been admitted in hospitals, but up to that time 18,000 manifest cases had been admitted, and of this number clinical diagnosis was not confirmed in 4,305 cases. This was probably due first to the fact that following especially the pandemic of influenza many residual, chronic, pulmonary infections closely resembling tuberculosis were mistaken for the latter disease; and second, when the tuberculosis hospitals were broken up in France, probably many doubtful cases were returned as tuberculosis, which under other circumstances would have been differentiated.

A year ago there were 2,665 neuro-psychiatric patients in general hospitals. During the year nearly all of these were disposed of, as well as the major portion of a thousand more admitted during this period. Those who had entirely recovered and those who had attained a safe and stable condition were sent to their homes. All others requiring further treatment were referred to the Bureau of War Risk Insurance. This bureau then usually designated a civilian hospital near the home of the soldier to which institution, after his discharge from military service, the man was sent. He was then compensible and cared for under the direction of that Bureau.

Over 9,000 neuro-psychiatric cases—approximately the same number as for tuberculosis—were returned from France. Every effort is being made to detect and prevent the enlistment of the mentally deficient and much attention is being given cases discovered in the service. Many of the malefactors at the military Disciplinary Barracks are mentally abnormal; mental deficiency and constitutional psychopathic state are particularly common. In peace and in war, the rejection for service of the tuberculous and the neuro-psychiatric, and the prompt detection and appropriate care of those in the service who develop clinical manifestations, are two very important problems of the Medical Department and we shall not soon set aside the experience gained nor forget the lessons learned in these diseases during the war.

Physical reconstruction was being extensively carried on a year ago in 28 general hospitals with a personnel of 2,200 officers, aides, etc. and about 19,000 patients were enrolled for instruction and treatment. Today, by reason of reduction in sick and closure of hospitals, 8 institutions are carrying on the work with a staff of 400 and about 3,500 patients enrolled. This work has consisted of educational and vocational training on the one hand, and of physio-therapeutic measures on the other. The work of physical reconstruction as a whole has been so extensive and so varied, and in the essentials so well worth the energy and enthusiasm given, that its usefulness in general hospitals in time of war is beyond question. In times of peace its utility would appear to be a question of the scope of application. With particular reference to physio-therapy, this is really a part of the treatment of many injuries and has been so in varying degree for many years, and obviously is indicated in all general hospitals in peace or war. The World War has given a great opportunity to test out every activity developed in the field of Physical Reconstruction. Some of it will go; some will remain. The degree in which it is adopted by large hospitals and the scope of its application in them will be observed with the greatest interest.

The year has been a very active one for the laboratory services. Though the laboratory personnel has decreased 85 per cent, the work has been satisfactorily accomplished, and in absolute quantity was but 12 per cent less than the year previous. This fine showing has been assisted by the closure and consolidation in general hospitals, but better organization and group work has been a very important factor in increasing the efficiency in this service. For further improvement Corps laboratories are being organized—one for each of the corp areas covering the United States, and infectious disease charts showing the incidence per 1,000 in the troops are to be kept by all hospitals.

Researches are being prosecuted with the object of securing a sterilizing agent for drinking water for use by the individual soldier and progress made along this line; a disinfecting soap for pathogenic organisms affecting the respiratory and intestinal tracts and an anti-pneumococcus vaccine. Also, work is being done on the etiology of influenza.

The dental service has been very active and at the general hospitals is organized to include dental surgery. The benefits derived from skilled, technical assistance and the diagnosis of obscure systemic lesions, with possible dental or oral foci of infection, have proven of great value in our hospitals. The establishment of Maxillo-Facial surgical services in certain general hospitals has taken advantage of experience gained by the plastic surgeon and dental surgeon during the World War and has been of great value. Naturally, this particular class of service is drawing to a close, owing to the cure and final disposition of this type of war injury. With reference to extractions, the number was comparatively low and the ratio of root canal fillings to extractions is evidence of a thoroughly constructive and restorative year's work and is worthy of notice, as it represents to what extent the dental service has been able to reclaim and restore, and it indicates that this work is regarded as important in Army practice, where we strive to maintain a healthy and serviceable condition of mastication.

In looking back over the year's professional work, and on going through the hospitals, it is observed that the product—the cured or reconstructed soldier—has disappeared from view. He has gone almost as rapidly as he came—has resumed his position in the ranks of civil pursuit. We see only the wrecks that remain or the cases that have relapsed. We are brought, therefore, to the realization that, notwithstanding this work has been creative work of the highest type, little save the record remains to view.

This system of hospitals is financed mainly by two appropriations, one of which is controlled by the Hospital Section and is for the purpose of procuring hospitals and the installation of fixed equipment; the other, though not controlled by this section is under the control of the Surgeon General's Office, and covers expenditures for medical and surgical supplies and the hire of special personnel. The Hospital Section prepares requisitions for the ensuing year and defends these requisitions before the Secretary of War and Congress, and after securing the funds, authorizes their expenditure for the installation, maintenance and improvement of hospital facilities as regards space and fixed equipment. During the past year $5,000,000 covered the work of the Hospital Section, and this included the construction of at least one new general hospital costing more than $1,000,000, and additions to another permanent general hospital amounting to more than $500,000. Also, during the year additional property has been acquired for the Army Medical School to which reference will be made later. The reduced amount of work contemplated for the coming year is reflected in the lesser amount secured from Congress for the work—one and one-half million dollars.

While the movement of sick by hospital trains is not a subject of concern to civilian hospital administrators, a few remarks on the subject should be of interest. In the military service this subject demands consideration and particularly so in time of war. The year just past has, of course, not been a particularly active one for the hospital trains. On July 1, 1919, there were in service four hospital trains, so called, each train consisting of seven cars, as follows: 1 kitchen and attendants car, 1 baggage and office car, 1 standard Pullman, 2 tourist cars, 2 hospital cars with beds.

In addition to these trains there were 20 so-called "unit cars," each car equipped with kitchen, food storage and refrigeration, quarters for necessary personnel, an office and 22 adjustable Glennan bunks for sick. Each such car was a nucleus for a hospital train. In using these cars, the plan adopted was to attach six or seven standard Pullman or tourist cars, to one of these unit cars, thus forming a hospital train of 250 beds. The patients, except the serious cases which were placed in the unit car, were carried in the Pullmans and were subsisted from the kitchen in the unit car, and cared for by the medical personnel of that car. This plan was found to be very satisfactory and economical, for it was unnecessary on completing a movement to pay return mileage on the Pullman cars used, as they were simply dropped at their destination, and the unit car alone returned to the ports. On the other hand, with the original hospital trains return mileage had to be paid for the entire train. It will, therefore, be seen that the 20 unit cars referred to constituted potentially twenty 250-bed hospital trains.

This system of movement of the sick has been so satisfactory in this country during the war that the office has adopted the scheme for application to the whole question of transporting the sick, not only in home territory, but along the lines of communication from the evacuation hospitals to the rear. In accordance with this, the four fixed hospital trains have been disposed of and the 20-unit cars only remain, and for these some improvements and attachments are now being developed.

During the year just passed these unit cars, with their complement of standard Pullmans, moved 12,000 overseas sick from the eastern ports, and about 5,000 from one general hospital to another in the United States. This work, compared to the 160,000 moved during the year preceding, indicates the great reduction in activity in this department.

A general scheme of hospital abandonment was formulated. It was based upon the requirements for the acute sick from the decreasing forces under arms as well as for the more prolonged cases returning from overseas. The policy of treating the sick until they had reached a point where further treatment in a military hospital was not necessary was taken into consideration along with the geographical location of the homes of sick and large population centers. Also, the fact that certain hospitals were in comparatively expensive, leased properties and certain others on military reservations influenced the problem. (See Table 4.) Accordingly, a program giving the relative order of abandonment of the hospitals was determined upon and made known to those concerned over a year ago, and fixed the date (tentative, of course) for the abandonment of every general hospital and extended over a period of a year and a half to its maturity.

In conformity with this schedule, 21 of the 30 general hospitals in operation a year ago have been abandoned. Some consisted of modified military posts, which when abandoned reverted to their normal military function; others consisted of leased properties altered for hospital purposes, and these with the exception of 7 which were turned over to the Public Health Service, have been returned to the lessor. The 17 large base hospitals in operation a year ago with a capacity of 1,500 beds each, have been reduced to about 150 beds each and are now operated as station hospitals under control of the respective corps surgeons in whose corps areas they are located. The 8 port hospitals have been salvaged in some instances, in others returned to the lessor and in one instance transfer was made to the Public Health Service. During the past year and in accordance with the schedule, hospitals containing 57,000 beds were abandoned although the number of patients moved was inconsiderable, as hospitals which were approaching their date for abandonment were allowed to decrease in activity by withholding transfers to them and by facilitating their discharge rate. Through the careful operation of this abandonment program and the intelligent coöperation in hospitals, we were able to abandon 21 general hospitals with 57,000 beds with the movement of only 3,676 patients.

The subject of training has always received close attention in the service, but at no time during peace has interest been as high as at present. By reason of recent legislation, 2 per cent of the commissioned personnel of the Medical Corps may be sent to institutions for special training. There is a limit placed upon the funds allowed for the necessary tuition, but owing to the great generosity and the hearty spirit of coöperation shown by many institutions in remitting tuition fees, this number may be greatly exceeded. At present 20 medical officers are pursuing special courses in surgery, internal medicine, X-ray therapy, infectious diseases and in public health work at prominent universities and hospitals. Also, within the services at our larger hospitals special courses of training have been underway and will be extended in the future covering the general divisions of hospital and professional work, including the branches of surgery, medicine, and laboratory technique. The same outside educational provisions have been accorded the Army Nurse Corps, in accordance with which many nurses will be sent to recognized civilian institutions for instruction in public health nursing, hospital administrative work and certain specialties of medicine and surgery. A well merited increase of 20 per cent on flat pay in the Nurse Corps has been secured. Relative rank has been given to the nurses without their request, and now that they have it, it is believed that it may be of use as a lever to increase the standard of efficiency and conduct.

An innovation in the form of interneships in Army hospitals for candidates for commission in the Medical Corps of the Regular Army has recently been introduced. A commission as a first lieutenant will be given the graduate of a Class A medical school who has an average standing of 85 per cent or over, who receives the indorsement and recommendation of the medical school authorities, who meets the physical requirements and who completes a year of interneship in an Army hospital with credit and to the satisfaction of the Surgeon General.

Improvements in the training of the enlisted personnel of the hospitals are being secured. Special ratings or classifications are being authorized which carry increases of pay irrespective of the military rank of the man. These special ratings cover various degrees of proficiency along such lines as assistants, technicians and apprentices in the work of the operating room, laboratory, dental clinic, pharmacy, etc. We have had, for a long time, special ratings for increased pay, but it is believed that further improvement to the service will result from the above specialties as now authorized.

The Army School of Nursing has been established by the Surgeon General's Office and maintains branches at the larger general hospitals where 500 students are in attendance. Affiliation has been arranged with other institutions where from 1 to 1½ years of their 3-year course is spent on affiliated work. The military hospitals provide excellent experience in all lines of work except pediatrics, gynecology, obstetrics and public health nursing, and this experience is provided by affiliation.

Candidates for graduation must have completed the prescribed course of three years and pass the final examination. Upon graduation the student may become a member of the regular Army Nurse Corps in the order of the vacancies, or, should there be no vacancy, she will be placed on a list for appointment as vacancies occur. She is eligible for registration in any state and eligible also for membership in the American Nurses Association, the National Organization for Public Health Nursing, enrollment in the nursing service of the American Red Cross, and for advanced courses in the teaching, administrative, and public health nursing fields. Great assistance has been given to the service from outside sources in the establishment of these schools. They are now in very satisfactory operation. They are elaborately equipped and completely staffed with full time instructors enthusiastic in their work, and are expected to turn out a product second to none.

The function of the Army School of Nursing today is not primarily that of a feeder for the Nurse Corps of the Army. This is of secondary importance and not a necessity at this time, though during the war it was distinctly so. The greater purpose today may be said to be the creation of an ideal school; the provision of a better trained body of nurses, and the maintenance of a fuller and more cordial relationship with the medical and nursing professions at large.

Another new factor has been developed in the Medical Department training scheme. The Medical Department Field Service School has just been established at Carlisle, Pa., where the various activities of field service will be worked out and taught. So far as hospitalization is concerned, the principal work that is to be done here will be the instruction in hospital administration as applied to the mobile hospital units in time of mobilization or war. After the completion of the field course here, it is contemplated to send the candidate for commission to the Army Medical School for the professional and technical course.

In closing this résumé and prospectus, it is desired to outline the chief project for the future as regards professional training—the Army Medical Center. It is proposed to build at Washington, D. C., on the Walter Reed Hospital reservation: first, a larger Walter Reed Hospital of probably 750 beds; second, an Army Medical School; and third, a new Surgeon General's Library and Museum.

Money has been secured for the purchase of additional land necessary to accommodate all buildings. Half of the land has been secured and the purchase is nearing completion. The site is one of great natural beauty and well situated on Sixteenth Street extended—the most beautiful boulevard of the city. The enlargement of the Walter Reed Hospital proper will include, in addition to the surgical, medical, and laboratory services, a separate neuro-psychiatric group, planned and situated with due regard to the most modern conception of treatment; a separate group for the nurses home and the Army School of Nursing; a residence group, a recreation and athletic section, and a personnel section—all to be grouped about a large natural amphitheater and formal garden area.

The Army Medical School, which is to coöperate with the hospital, is to be located, also, just off this common center. It is to be a single large structure accommodating all the activities of the school, embracing graduate courses of instruction for all the divisions of the Medical Department, including the Dental and Veterinary Corps and covering all the important professional subjects supplemented with the fullest research and laboratory work. This building will probably cost about $2,000,000—of which $500,000 has already been secured. The planning of this building is now under way.

The Surgeon General's Library and Museum are to occupy two separate buildings on commanding hills, situated midway between the other buildings of the Army Medical Center and Sixteenth Street and facing each other across a beautiful drive leading from Sixteenth Street into and through the reservation. While they will not constitute functionally an important part of the Medical Center, they will as in the past, be of great assistance to the medical profession at large and will be so situated as to be of the greatest availability to all who are interested in things medical and instruction generally.

It is intended that this plant when completed shall be one of the best equipped Medical Centers for graduate instruction in the United States, and that the Army Medical Center as a whole shall constitute an important unit in the instruction system of the country, and that it shall be the common meeting place for all in the medical profession within and without the service.

TABLE 1.—*Hospital Situation a Year Ago.*

[Prepared by Census Section, Hospital Division]

GENERAL HOSPITALS

No.	Name and Location	Bed situation		
		Occupied	Vacant	Total authorized capacity
1	AN GH Hot Springs, Arkansas	211	55	266
2	GH Ft. Bayard, N. Mex	876	124	1,000
3	GH San Francisco, Calif	1,584	132	1,716
4	WR GH Takoma Park, D. C	1,754	146	1,900
5	GH 2 Fort McHenry, Md	2,487	313	2,800
6	GH 3 Colonia, N. J	1,331	219	1,550
7	GH 4 Fort Porter, N. Y	132	118	250
8	GH 5 Fort Ontario, N. Y	821	202	1,023
9	GH 6 Fort McPherson, Ga	2,160	705	2,865
10	GH 7 Roland Park, Md.[1]	....	....	....
11	GH 8 Otisville, N. Y	847	153	1,000
12	GH 11 Cape May, N. J	464	246	710
13	GH 12 Biltmore, N. C	326	125	451
14	GH 16 New Haven, Conn	441	59	500
15	GH 19 Oteen, N. C	1,034	266	1,300
16	GH 20 Whipple Barracks, Ariz	267	133	400
17	GH 21 Denver, Colo	1,364	245	1,609
18	GH 24 Parkview, Pa	613	87	700
19	GH 25 Fort Benjamin Harrison, Ind	630	397	1,027
20	GH 26 Fort Des Moines, Iowa	874	186	1,060
21	GH 27 Fort Douglas, Utah	456	43	499
22	GH 28 Fort Sheridan, Ill	3,242	1,058	4,300
23	GH 29 Fort Snelling, Minn	913	362	1,275
24	GH 30 Plattsburg Barracks, N. Y	749	121	870
25	GH 31 Carlisle, Pa	522	278	800
26	GH 36 Detroit, Mich	601	308	909
27	GH 38 East View, N. Y	536	253	789
28	GH 41 Fox Hills, Staten Island, N. Y	1,175	293	1,468
29	GH 42 Spartanburg, S. C	569	431	1,000
30	GH 43 Hampton, Va	1,164	0	1,164
	Total (30 general hospitals)	28,143	7,058	35,201

[1] Operated as a school for blind.

BASE HOSPITALS

No.	Name and location	Bed situation		
		Occupied	Vacant	Total authorized capacity
1	BH Bowie, Texas	140	610	750
2	BH Devens, Mass.	304	896	1,200
3	BH Dix, N. J	808	392	1,200
4	BH Dodge, Iowa	314	586	900
5	BH Gordon, Ga	96	404	500
6	BH Grant, Ill	400	800	1,200
7	BH Jackson, S. C	327	673	1,000
8	BH Lee, Va	355	645	1,000
9	BH Lewis, Wash	391	359	750
10	BH Meade, Md	471	729	1,200
11	BH Pike, Ark	416	334	750
12	BH Fort Riley, Kans.[2]	722	478	1,200
13	BH Fort Sam Houston, Tex.[2]	1,167	43	1,200
14	BH Shelby, Miss	119	381	500
15	BH Sherman, Ohio	599	881	1,480
16	BH Taylor, Ky	544	456	1,000
17	BH Upton, Long Island, N. Y	713	87	800
	Total (17 base hospitals)	7,886	8,759	16,645

[2] Hospitals treats oversea cases.

HOSPITALS UNDER PORT OF EMBARKATION, HOBOKEN, N. J.

1	GH 1 Williamsbridge, N. Y	638	352	990
2	BH Camp Merritt, N. J	1,569	330	1,899
3	BH Camp Mills, Long Island, N. Y	230	770	1,000
4	EH 1 St. Mary's Hospital, Hoboken, N. J	515	135	650
5	EH 4 Polyclinic Hospital, N. Y	238	136	374
6	DH 1 Ellis Island, N. Y	29	551	580
7	DH 3 Greenhut Building, N. Y	598	2,780	3,378
	Total (7 debarkation and embarkation hospitals)	3,817	5,054	8,871

HOSPITALS UNDER PORT OF EMBARKATION, NEWPORT NEWS, VA.

1	BH (also a DH) Camp Stuart, Va	950	2,294	3,244

RECAPITULATION

30	General hospitals	28,143	7,058	35,201
17	Base hospitals	7,886	8,759	16,645
7	Port of embarkation, Hoboken, N. J	3,817	5,054	8,871
1	Port of embarkation, Newport News, Va	950	2,294	3,244
	Grand total (55 hospitals)	40,796	23,165	63,961

REMARKS.—Hereafter the base hospitals at the camps and cantonments will be omitted from this report, these hospitals being materially reduced in size and caring for the sick of their respective commands only. They are in fact camp or station hospitals and should be so considered.

TABLE 2.—*General Hospital Situation Today*

No.	Hospitals caring for oversea patients and others requiring general hospital treatment	Bed situation		
		Occupied	Vacant	Total authorized capacity
1	AN GH Hot Springs, Ark	67	133	200
2	Fitzsimons, G. H., Denver, Colo	688	512	1,200
3	Hoff, G. H., Staten Island, N. Y	556	194	750
4	Lawson, G. H., Atlanta, Ga	379	221	600
5	Letterman, G. H., San Francisco	548	202	750
6	Lovell, G. H., Fort Sheridan, Ill	808	192	1,000
7	O'Reilly, G. H., Oteen, N. C	442	58	500
8	WR GH Takoma Park, D. C	1,265	235	1,500
9	BH Fort Sam Houston, Tex.[1]	330	270	600
	Total (9 general hospitals)	5,086	2,017	7,100

[1] Treats local sick as well as general cases.

TABLE 3

Hospitals	Fractures	Osteomyelitis (with fracture)	Osteomyelitis (without fracture)	Peripheral nerve (alone)	Peripheral nerve (complicating fracture)	Peripheral nerve (complicating osteomyelitis)	Peripheral nerve (complicating fracture and osteomyelitis)	Empyema	Maxillo-facial	Amputations	General surgical	Totals per hospital
Lawson General Hospital	23	12	53	5	14	0	6	14	0	2	97	226
O'Reilly General Hospital	2	0	14	0	3	0	1	7	1	1	51	80
Fitzsimons General Hospital	4	0	4	1	0	0	0	5	1	4	25	44
Lovell General Hospital	67	204	10	15	23	1	52	24	4	25	114	477
Hoff General Hospital	56	80	8	81	34	2	20	37	4	3	135	460
Letterman General Hospital	25	28	8	21	11	0	6	13	3	9	108	232
Walter Reed General Hospital	127	173	17	29	72	3	13	22	42	85	302	785
SH Fort Sam Houston	36	6	4	1	2	0	1	10	2	2	91	155
SH Columbus Barracks	...	...	...	...	...	...	...	...	12	...	...	12
SH Jefferson Barracks	...	...	...	...	...	...	...	...	23	...	...	23
Total	340	503	118	153	159	66	99	132	92	131	923	
Grand total in hospitals												2,494

TABLE 4.—*Hospital Section.*

[Confidential. August 8, 1919.]

Tentative Priority Schedule for Abandonment and Reduction in General Hospitals.

N. B.—Subject to change on all dates subsequent to September 8, 1919. This schedule made and dated August 8, 1919. All figures based on hospital table of August 1 and on an assumed reorganized Army of 300,000 strength.

Total beds available in general hospitals August 8, 1919	33,414
Number of beds in General Hospitals now closing and which will be entirely closed by September 1	3,433
Total general hospital beds unaffected as yet by abandonment orders.	29,981

Therefore the number 29,981 includes the number of General Hospital beds to be kept permanently as well as those to be ordered abandoned. It is believed that 3,750 beds (which is 1 per cent of a 300,000 army) is a sufficient number to hold permanently.

Priority schedule of abandonment:

Base number of beds from which deduction is made (see above) 29,981

Proposed Abandonment

U.S.A.G.H. No.	Date	Number of beds to be abandoned	Beds remaining in hospital	Total G. H. beds abandoned	Total G. H. beds remaining
28	Aug. 8, 1919	1,000	3,302	1,000	28,981
6	Aug. 8, 1919	1,000	1,860	2,000	27,981
30	Aug. 8, 1919	500	699	2,500	27,481
28	Sept. 30, 1919	500	2,802	3,000	26,981
2	Sept. 30, 1919	1,000	1,900	4,000	25,981
30	Sept. 30, 1919	699	0	4,699	25,282
31(?)	Oct. 15, 1919	900	0	5,599	24,382
3	Oct. 15, 1919	1,550	0	7,149	22,832
28	Oct. 15, 1919	500	2,302	7,649	22,332
6	Oct. 15, 1919	500	1,360	8,149	21,832
20(?)	Oct. 15, 1919	400	0	8,549	21,432
1(?)	Oct. 15, 1919	830	0	9,379	20,602
26(?)	Oct. 15, 1919	1,060	0	10,439	19,542
4	Oct. 31, 1919	250	0	10,689	19,292
8	Oct. 31, 1919	1,000	0	11,689	18,292
42	Oct. 31, 1919	1,000	0	12,689	17,292
28	Oct. 31, 1919	1,000	1,302	13,689	16,292
2	Nov. 30, 1919	800	1,100	14,489	15,492
2	Mar. 31, 1920	1,100	0	15,589	14,392
Bayard	Mar. 31, 1920	1,000	0	16,589	13,392
19	Mar. 31, 1920	800	500	17,389	12,592
21	Mar. 31, 1920	803	800	18,192	11,789
7	June 30, 1920	([1])	...	...	...
43	June 30, 1920	1,349	0	19,541	10,440
END OF FISCAL YEAR					
6	July 31, 1920	1,360	0	20,901	9,080
28	Aug. 30, 1920	1,302	0	22,203	7,778
41	Sept. 30, 1920	2,012	0	24,215	5,766
Letterman	Sept. 30, 1920	1,500	7,700	25,715	4,266
Hot Springs	Sept. 30, 1920	16	250	25,731	4,250
Walter Reed	Oct. 30, 1920	500	1,500	26,231	3,750

[1] No beds; merely lease and control.

The 3,750 beds shown at foot of last column and held for permanent use are shown distributed in the following table:

Permanent Hospitals as Selected

Name	War capacity	Tentative reduction proposed	Capacity to be regarded tentatively as permanent
Walter Reed	2,000	500	1,500
Letterman	2,200	1,500	700
Hot Springs	266	16	250
No. 19 (T.B.)	1,300	800	500
No. 21 (T.B.)	1,603	803	800
Total	7,369	3,619	3,750

THE MAKING OF THE MEDICAL AND SURGICAL HISTORY OF THE WAR OF THE REBELLION[1]

By Lieutenant-Colonel LOUIS C. DUNCAN
Medical Corps, United States Army

CREDIT for the Medical and Surgical History of the Civil War appears to be due to Surgeon General William A. Hammond. Being placed at the head of the Medical Department of the Army in the spring of 1862 he brought new life to that somewhat sclerosed institution. He quickly improved the records, instituted real hospitals, adopted an ambulance system and projected a History. During the war no more could be done than to collect material. The principal measures adopted were:

May 1, 1862.—Important changes made in sick and wounded returns.

June 9, 1862.—A circular from the Surgeon General's Office announced the intention to prepare and publish a medical history. On the same day Asst. Surg. J. J. Woodward, U. S. Army, was placed in charge of surgical records. He was later principal editor of the medical volumes.

July 1, 1863.—Surg. J. H. Brinton, U. S. Volunteers, was placed in charge of surgical records and also made curator of the Army Medical Museum, then being formed. A consolidated statement of gunshot wounds was published.

September 8, 1863.—A statement of sickness and mortality, prepared by Woodward, was issued.

June 24, 1864.—A circular directed the collection of pathological specimens.

October 3, 1864.—Surg. George A. Otis, U. S. Volunteers, was placed in charge of surgical records. Subsequently he became editor of the surgical volumes.

In November, 1864, General Orders directed the preparation of professional and historical material, and letters followed directing improvements in returns. About the same time a pathological collection was established, under charge of Brinton and Woodward. Without this collection the history could not have been illustrated.

1865.—By authority of Secretary Stanton Circular No. 6 was published: "A report upon the extent and nature of the material available for the preparation of a Medical and Surgical History of the War," of which 7,500 copies were distributed.

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[1] As Related in the Reports of the Surgeon General.

The war now coming to an end, real work could begin on the preparation of volumes. Here the story, as related in the Reports of the Surgeon General of the Army, begins.

Year Ending June 30, 1865.—The Surgeon General stated that 30,000 reports of cases and 7,630 specimens were being arranged and tabulated as a Medical History of the War. An appropriation was to be asked of Congress for publication of the first volume.

It may be explained here that the whole History was planned to fill six large volumes. These six volumes were to form three parts, I, II and III. Each part was to consist of one medical volume and one surgical volume, and this plan was adhered to.

1866.—The "Records" were transferred to a fireproof building on Tenth Street. They then consisted of: 16,000 folio volumes of hospital registers; 47,000 burial records; 16,000 hospital muster and pay rolls; alphabetical register of dead (250,000 white and 20,000 colored); pathological collection; thousands of miscellaneous reports.

Much of the manuscript and several illustrations for the first medical volume were ready.

1867.—No report of an appropriation is made. The tracing out of surgical histories by all possible means had gone on most industriously. The total number of such histories then amounted to 207,941. There were 59,519 additional cases that had been compiled and were ready to enter on permanent registers.

This year Circular No. 1 (later a part of the History) was issued. It contained reports and illustrations of 53 amputations at the hip joint. The Army Medical Museum was opened in the new building on Tenth Street, April 14, 1867.

1868.—Five hundred pages of manuscript were ready for the printer, and much statistical material had been prepared; also 16 lithographs and 122 woodcuts. Every effort was being made to trace the subsequent history of each and every wound and injury. Aided by Secretary Stanton, who took a deep interest in the work, the Surgeon General had asked Congress for an initial appropriation, which was granted on June 8, 1868. The amount is not stated, but it was not less than $60,000 and may have been more. This was not expected to complete the publication.

An editorial board was now designated, consisting of Surg. George A. Otis, assigned to the preparation of the three surgical volumes, and Asst. Surg. J. J. Woodward, assigned to the preparation of the three medical volumes. By a strange coincidence both these officers died before the third volumes were completed, as will be related further on.

1869.—This year some printing was done, 657 pages of the first medical volume and 100 pages of the first surgical volume. Manuscript and illustrations for the former were now complete. Printing was authorized by act of Congress, March 3, 1869.

During this year, Circular No. 2 was published: "Excision of the head of the femur for gunshot wounds," with abstracts of 380 cases. This was later included in the History. Nothing is said of expenditures.

1870.—The printing of the first volume (medical) was nearly completed. This volume embraced the statistical tables, in 750 pages, and an appendix of 400 pages, containing the reports of medical directors in the field. A few hundred double-column quarto pages seem to have meant little to the medical officers compiling these huge volumes. The tracing of subsequent histories of wounds and disabilities went on with tireless energy. As a matter of fact, both volumes of Part I were completed by November, 1870.

1871.—This year 36 quarto volumes of photographs, 50 plates each, of surgical cases were completed and distributed to various medical schools and societies in this country and in Europe. Part I was being printed and it was the intention to ask an appropriation to continue the publication. Although it is not so stated, it appears that 5,000 copies of the first part were printed and that an appropriation of $60,000 had been made.

The first surgical volume covered all wounds and injuries of the head, neck, spine, chest and upper extremities.

Circular No. 4, a report on barracks and hospitals throughout the country, by Surg. J. S. Billings, was also published.

1872.—"The first part of the Medical and Surgical History of the War was in a state of sufficient forwardness to lay before Congress, near the close of the last session. By the wording of the act making appropriation for the continuance and completion of this work its *distribution* is still to be ordered by Congress."

During this year Circular No. 3 (1871), "A report of surgical cases treated from 1865 to 1871," 300 quarto pages, was published.

1873.—This year mention is made for the first time of an appropriation. June 8, 1872, $60,000 was appropriated "for completing the Medical and Surgical History of the War." Of this amount $12,706.12 was dispensed during the year. Part II was then in press.

Distribution of the 5,000 sets of Part I was authorized by Congress, as follows:

Sent to Congressional Committee	12
Sent to Senators	1,000
Sent to Representatives	2,000
Sent to Library of Congress	50
Damaged and imperfect	70
To be issued by Surgeon General	1,868
Total	5,000

Delivery of copies from the Government Printing Office began February, 1873. The Surgeon General said:

> The demand for the work has been very great, and the number of copies placed at the disposal of this Office proves insufficient to supply those who as ex-medical officers, having rendered satisfactory service through the war, may be considered as properly entitled to them.

As some 12,000 medical men were in the service during the war, this demand may be understood. Ultimately a second printing of 5,000 additional sets was authorized.

1874.—Printing of Part II was going on rapidly this year, $28,145.22 being expended. Of this part, some 700 pages had been printed and nearly all the plates prepared. The preparation of plates is frequently spoken of in all reports. It was the most expensive feature of the work. There were then no photographic engraving processes; every plate had to be prepared by hand.

This year the Surgeon General recommended the printing of an additional 5,000 copies of the work, at an estimated expense of $50,500. The itemized estimate is rather remarkable.

Paper, composing and printing	$7,500
Binding in cloth	5,000
Plates	38,000

The plates were estimated to take up nearly three-fourths of the entire appropriation, which does not include clerk hire and miscellaneous expenses.

1875.—On March 3, 1875, Congress appropriated $60,000 for a second edition of 5,000 copies, and printing was begun. During the year there was disbursed:

On first edition	$6,868.86
On second edition	19,911.25

Circular No. 8, "Report on hospitals and barracks," was issued this year. This was a very complete report of 625 pages, by Surg. John S. Billings.

1876.—During this year there was expended on the History:

First edition	$11,420.41
Second edition	25,274.74

Work on the second surgical volume (surgical volume of Part II) was also completed, 1,024 pages. It included wounds of the abdomen, pelvis and lower extremities. A "Report on transporting wounded soldiers by railway in time of war," 56 pages, was also published.

1877.—This year the disbursements were:

First edition	$2,967.75
Second edition	10,821.80

On March 3, $25,000 was appropriated for Part III. The work of stereotyping the medical volume of Part II was begun in January, 1877, and 325 pages had been completed. This volume was prepared by Surg. J. J. Woodward and was entirely devoted to the alvine fluxes.

A second edition of the surgical volume (Volume 2, Part II) had been completed, under the supervision of Surg. George A. Otis. The third surgical volume was also under way.

A report on the transportation of sick and wounded by pack animals was prepared and published, under the same editorial supervision.

1878.—In 1878 the amount disbursed was:

First edition	$1,540.78
Second edition, Part III	7,686.12

Work on the second medical volume had progressed steadily, if slowly. Some 691 pages had been stereotyped and the remainder was expected to be done in a few months The third surgical volume was also progressing, 120 pages being in type and many illustrations ready.

1879.—The printing of the second medical volume was completed in March, 1879, thus completing Part II of the work. Both the medical and surgical volumes of Part III were well along, especially the surgical volume, prepared by Surg. George A. Otis. During this year $8,785.40 was expended.

1880.—During the year 1880 but $3,518.60 was expended. Part II had been completed and the progress of Part III, particularly the medical volume, was delayed by the sickness of Surg. J. J. Woodward.

It may be mentioned, though somewhat irrelevant, that this year the Surgeon General first asked for an appropriation for a new and fireproof building for the great museum and library which Billings, Otis, Woodward and their associates were building up.

1881.—This year only $2,964.90 was expended and the balance was down to $13,388.15. Maj. George A. Otis, editor of the surgical volumes of the History, died on February 23, 1881. Fortunately, his work was well forward. Major Otis came into the Army in 1861, as surgeon of the 27th Massachusetts Volunteers, and entered the Regular Service in 1866. He was curator of the museum and in charge of surgical records from July 22, 1864, until his death. Surg. D. L. Huntington was then placed in charge of the surgical volume.

1882.—The sum of $4,288 was disbursed in 1882. Of the third surgical volume, 702 pages, the manuscript was practically complete. The illness of Surg. J. J. Woodward still delayed the preparation of the third medical volume.

1883.—In 1883 but $565.10 was expended. However, the third surgical volume was completed. It was devoted to surgery of the lower extremities, to material, transportation of wounded, and the ambulance system. It contained an index of all three surgical volumes and totaled 1,024 pages.

1884.—The medical volume, delayed by the illness of Surgeon Woodward, was interrupted by his death on August 17, 1884. Surg. Charles Smart was then put in charge of this final volume, which had to do with fevers, diseases thought to be due to exposure (as pneumonia and rheumatism), and miscellaneous diseases. This volume also had an appendix, in which the general hospitals were described.

Only $31.05 was expended on the History this year.

1885.—The manuscript of the third medical (and final) volume of the History approached completion and was almost ready for the printer. I hope to be pardoned for digressing to state that this year a contract was let for the Museum and Library Building, and that the Surgeon General recommended a "Hospital Corps" in place of the detailed line men then employed as cooks, nurses, etc.

But $15 was expended on the History this year.

1886.—Publication of the final volume was delayed by pressure of work at the Government Printing Office. The manuscript was all completed in February, 1886.

The expenditure for this year was only $149.12.

1887.—During this year $4,311.00 was expended. The moving spirits of the work appear to have departed. So recently as 1887 Congress passed the "Act to organize the Hospital Corps of the Army of the United States."

1888.—In 1888, at least twenty-three years after the definite beginning, this monumental History was completed.

Six immense volumes, of 1,000 pages each, was the fruit of the laborers. These six volumes were more than the equal of twelve volumes of the average modern medical book. In volume they approach an encyclopædia. In extent they covered the field of military medicine and surgery as then known, but naturally offered almost nothing on sanitation. They were professional and statistical volumes, with a wealth of case history abstracts never equaled before and which probably could never be equaled again. That they were so purely professional is unfortunate, for the principal value of such books passes quickly. The really valuable material now is that termed "statistical," together with the purely historical portions dealing with hospitals, field service, transportation, etc.

TEACHING—IN THE ARMY AND OUT

By Captain ELBRIDGE COLBY
Infantry, O. R. C., University of Minnesota

We publish the following article by permission of the author. It appeared in *School and Society* in the issue of October 16, 1920.

It is worth consideration as being in rebuttal of what President Eliot had to say in respect to methods of instruction in the Army and furthermore, because it is written as was President Eliot's criticism, by a university teacher. In Mr. Colby's summary we have, however, the views of a man who has had practical experience in both fields which would seem to qualify him, under the usual legal requirements, as an expert, an advantage which cannot be claimed by his distinguished coëducator in spite of the fact that he apparently speaks "*ex cathedra*."

We hope to publish, in an early number, another article by Mr. Colby on the same subject.—The Editor.

WHILE inveterate academicians are ridiculing colleagues or defending colleges, a word or so may not be amiss from a veteran returned to the academy. After some experience as an instructor, I served in the Army for a little more than two years and then resumed the teaching of college English. While in uniform I was most of the time a company commander, instructing and training soldiers both on the drill ground and in the N. C. O. schools; I was at headquarters as morale officer and was detailed as assistant to an inspector-general, thus looking at the system from both points of view. Many others of our university population did the same sort of things, though some were unfortunate enough to be translating ordnance pamphlets, handling staff statistics, reviewing court-martial cases, or initiating friendly propaganda instead of soldiering in the line of the Army. I use the term "unfortunate" advisedly and with a particular meaning in this connection. Personally I was unfortunate in never getting into action overseas, but I was fortunate enough to have an opportunity of bringing back from a strictly military service some attitudes and understandings of a new character to the settled academic routine. Because I believe many others have been similarly influenced, it will perhaps not be taken amiss if I here enumerate the four main things I learned while in the Army which I have found of value to me as a teacher. I tell them in the first person, simply because they happened that way. Mine are merely representative experiences. Since they are representative, they may throw some light upon the general effect of the war upon our teaching profession.

(*a*) College teachers normally have little patience with, or sympathy for, administrative detail. They are trained in bookish ways, brought up to an ideal of research or of popular lecturing, skilled in the appreciation and interpretation of knowledge. With few exceptions they are not trained as executives. They consider statistics the province of the registrar, finance of the bursar, and administration a matter for presidents, secretaries, and deans. Their meetings and councils are formless proceedings where problems are ramblingly argued first and motions made afterwards. They leave most of their administrative work to committees with practically blanket authority, or even approval before the fact. Their own reports are frequently late and often inaccurate. I have heard professors objecting that an "administrative" dean, newly appointed to relieve them of detail, was bothering them with letters to answer. In all of these respects I had myself, at one time or another, been guilty in word, thought, or deed.

Now, two years in the Army have taught me the necessity and the value of such administrative detail. I found that a company commander, to do his job thoroughly and well, had to assemble and familiarize himself with statistics concerning those under his command. He had to handle their money. He had to be an executive, as well as an instructor in things pertaining to the military. "Reports" were due at headquarters at certain dates and times, and they had to be accurate reports. From my staff experience I learned the value of such things to higher authority. From my experience as a company commander I learned the value of such reports even to the subordinate officers who prepared them. In order to keep track of property responsibility, in order to administer discipline wisely, in order to direct and shape training schedules and programs, I came to use these things to my own advantage. There were many who chafed under, and many others who glibly condemned Army "red tape": but for myself I learned its uses and values. Further than that I developed a habit of using it, and a habit of performing carefully minor administrative details. I brought this habit back to the university with me and applied myself, with a greater intelligence and a greater willingness, to those so often neglected matters of administration.

(*b*) "Rules are made to be broken," said the college teacher in the days before the war, and promptly O.K.'d a petition for a student. "I shouldn't sign this, but I'll do it this time," said the lecturer, admitting the freshman to a course for which he had not the stipulated prerequisites. "We can make an exception, in view of the circumstances," said the head of the department, and permitted the senior to carry more than the maximum number of hours per week. "I am giving these programs out," said the "chairman" to his staff, "so that you may at least have something to vary from." "I kept no record of attendance this semester," said the historian, when the time came to announce the list of those over-cut; and the class loudly applauded. "I want this to be known as a 'snap course,' said the whimsical old professor to his class in American literature, "so that people will come in here, be exposed to, and perhaps infected with, the charm of our national men of genius." I have heard these things said, and have heard of their being said from Maine to Texas, from Georgia to San Francisco. I have heard of "academic freedom." As a student I have sat under, and as a colleague I have associated with, learned men who taught economic and political theories destructive of the very doctrines on which their institutions contrived to exist and to thrive, and men some of whom led private lives of the most irregular character. I have seen professors stand on their feet and declare that they had frequently taken a very public stand on very contentious public questions, without being hindered in the least by their fellows or their superiors. I have observed instructors insisting on their right to teach their classes by what methods they pleased so long as they "got results." I firmly believe academic freedom exists, and in the ante-bellum days I firmly believed in it.

Then I served in the Army. In uniform I learned the value of uniformity. We had heard of discipline and thought it meant punishment. In the Army, a dishonorable discharge or a guard house; in the schools, expulsion or a canning. But discipline is not punishment. It is loyalty. It is morale. It is a state of mind. It is a condition of the personnel which enables the leader to obtain orderly and efficient results. The company commander saw that not only his own orders were carried out, but also the orders of his superiors, and more especially the standing orders and regulations of the Army as a whole. There was no open winking at breaches of discipline, no granting of "exceptions." The young officer soon learned the danger of cheap popularity based on a slighting or a grudging attitude towards rules. The very success of the Army depended on the success of the organization as such, depended upon adherence to principles found satisfactory and universally applied. Every one worked with but one thing in view: the furtherance of the common plan. Every one realized the value of homogeneous effort and the wastefulness of individual variations, however well intentioned. The military service taught the value of unity of action and unity of purpose, the value of parallel, coördinated action. The training schedule said "outpost problems" from March 10 to March 14. On March 15 the major took his four companies out on a battalion "outpost problem." The captains had done their work; the men were uniformly instructed; and the battalion exercise was simply and effectively carried out. Now that I have exchanged the brown khaki for the black gown, I no longer believe in academic freedom. The sections, the courses, the departments, have each their tasks appropriately devised; each has its part to play; each course has its field to cover; each instructor has his students to train—all in furtherance of the common plan. Introduce "academic" or any other kind of freedom into such systematic machinery, and you have the same result you would have from introducing Bolshevism into the Prussian Guards. Exercise of academic freedom wastes time, distracts attention, creates what our educational psychologists call "a false interest," and ends in the failure of the carefully conceived general program. I will have none of it.

(*c*) One of the simplest axioms of educational psychology, combining the law of association with the practical principles of teaching, says that you should always proceed from the known to the unknown and make certain that each element is thoroughly understood before passing to the next. The teacher must always make things clear, and must be certain that he is clear. But I wonder how many of us did, prior to 1917, actually make things clear. We frequently found out in our quizzes and final examinations that our students knew very little; but we probably attributed that to their laziness or to their stupidity. Some of us even kept joke books of the "funny" things the students wrote; all of us repeated such things with great glee over the Faculty Club luncheon table. We were so egotistical that we attributed the malfeasance to our students instead of to ourselves. We seldom found opportunity actually to determine on the spot the success of our efforts. We waited until it was too late and then let their ignorance serve for our humor. We droned along the same old lectures from the same dusty, dog-eared notes, and strove for "interest" or for "accuracy" rather than for real instruction. We talked an academic, critical or technical, jargon—quite intelligible, it is true, to ourselves and our colleagues—without bothering to question its comprehensibility among our students. We forgot the splendid example of the editor of Shakespeare who read over his commentaries to his cook and was never satisfied with their clarity until she could understand.

In the Army we were teachers too, instructing men according to definite, progressive schedules. We had our jargon of "guides" and "pivots" and "balances" and "Fingers." A man could not do his job in "squad right" until he knew how to mark time; he could not do "left shoulder arms" until he knew the position of "port;" he could not designate a target until he knew the "vertical clock." At every stage of the instruction, the army officer had an immediate, concrete demonstration of the success of his teaching. He could always check by his results and reiterate when necessary. He saw with his own eyes how he had to make things clear. I prepared various instruction pamphlets for N. C. O.'s and for privates, and drew up orders for a very complex and exacting form of guard duty. I saw these things studied and learned by men with little more than a bare reading knowledge of English; I saw by what these men did where I had failed and where I had succeeded in making things absolutely clear. In such instruction I had to be clear, I had to be simple, and I had to be brief. In returning to university work I have tried to bring back this habit of clarity, and have tried to secure at every possible turn an absolute check on the effectiveness of my teaching.

(*d*) In the Army our duty was to instruct; in teaching most of us thought our duty was to hurl information at our students and then find out if any of it stuck. If a freshman was stupid, we would flunk him, drop him from the course, or tell him to get a tutor. But if a private was stupid, we could not get rid of him. Of course, there were "development battalions," but only the rarest cases went there. In the great majority of instances, the company commander simply had to instruct the just ordinarily stupid fellows. He could not flunk them or keep them permanently in the guard house. He had to scrutinize his results with minute care and apply in each case with an almost German patience the methods of instruction needed. The major or the inspector would be around, and a few men could spoil the appearance and the record of an entire command. The responsibility for the instruction was something, then, which I learned to assume in the Army, and I brought a feeling for it back to the university. I do not mean that all lame ducks should be handled as if they might prove to have been ugly ducklings. I do not mean that we should descend to teaching morons. Nor do I believe in pampering and petting and mollycoddling. But I likewise do not believe in the free and easy attitude of so many teachers. "Here goes," they seem to say, "If you get it, all right! If you don't, it's your fault, not mine." This is undirected effort, and therefore usually misdirected. Yet this is a principle upon which some of our courses are conducted. I used to do it in some degree myself. Now I believe it is wrong. I believe that—if the ordinary prerequisites are satisfied and if the student is willing to do his share—the teacher has the final responsibility of instructing accurately and completely. Like the company commander, he should be judged by his results. This belief I acquired in the Army.

EDITORIAL

MEDICINE IN THE TIME OF LOUIS XIV OF FRANCE

In the account of the life of Guy Crescent Fagon, *premier médecin* of Louis XIV of France[1] we have a realization not only of the responsibilities devolving on the Court Physician, but also an interesting sidelight on manners and customs of the times, particularly as they apply to our profession. To be charged with the conservation of the health of so eminent a personage as "*le roi soleil*" was, needless to say, a serious task and one that was not held without envy from less fortunate practitioners and not always attained save by methods which savored somewhat of very corrupt politics of our own times.

Fagon owed his accession to this position to the influence of Madame de Maintenon who was hostile to the previous incumbent, d'Aquin and effected his replacement by Fagon who was at that time her own physician. D'Aquin was the favorite of Madame de Montespan and this was of course good reason for supplanting him in an effort to minimize her influence with Louis XIV. At all events, it was skilfully brought about, d'Aquin discredited, pensioned and ordered from the court and forbidden to address the King either verbally or in writing.

The status of the medical profession had been much bettered under the rule of Louis XIV due to the fact that the fistula in ano, from which he suffered, and which had refused to respond to treatment by various ointments and salves was relieved by operation by Félix, the royal surgeon. This resulted in the rehabilitation of surgery in France and lifted what had been a discredited trade to the dignity of a profession. Someone has said, with much truth, that in the seventeenth century surgery could be divided into two epochs, that before the fistula and that after. Maréschal, the successor to Félix, benefited by this advancement and as was natural this kindly feeling toward the surgeon was reflected in the treatment of the physician also, so that Fagon assumed his duties as court physician under favorable auspices.

Aside from the prominence which attached to the King's physician there was not in reality much which tended to make the name of Fagon stand out as one who added very greatly to the sum of medical knowledge and advancement. He had no such claim to recognition as was gained by his contemporaries Sydenham of England, Sanctorius of Italy, Boerhaave of Holland or Hoffman of Germany. His principal claim to distinction was the political prominence which he attained as guardian of the health of the great Monarch of France. Of his own writings there is little which remains to mark or distinguish him and if it were not for the records of Saint-Simon, Dangeau and others in relation to the health of Louis XIV there would not be much to distinguish him from many others of the class of those days who wore red heels and the square bonnet and confused their clientele by their importance as often as they cured them.

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[1] Fagon, Archiatre du Grand Roi, by Pierre Eloy. Vigot Fréres, 23 rue de l'ecole-de-médecine, Paris, 1918.

The vogue of medicine in Fagon's time was catharsis and bleeding. The death of Marie Therese is evidence of this. Suffering from an abscess of the left axilla, the best that could be done for her was two bleedings and the administration of a powerful emetic, in spite of which the poor lady succumbed when the abscess burst into the pleural cavity. Medicine at that time was crude of course and it was often as much by chance as by any professional intervention that the sick were restored to health. And so the *Grand Monarque* was purged and bled by order of his medical adviser, not only for the ills to which his flesh was heir, but as a prophylactic measure and to avert illnesses which might lay him by the heels. History does not record any particular antipathy to this royal purgation, but it is well established that the King had a very lively fear of, and distaste for the opening of his veins.

Fagon studied the temperament of his distinguished patient and endeavored to regulate his diet and regimen to the advantage of his well-being. He objected to his indulgence in wine, (particularly champagne), and coffee also and endeavored to substitute sage tea and an infusion of Veronica. Small wonder that the royal patient rebelled and returned to the pleasures of the table. As a full-blooded man and given to the indulgence of his grosser appetites the King paid the penalty in illnesses of various kinds. From the records we find that in addition to the fistula which was so fortunate an illness for the surgeon Félix, he suffered from attacks of quinsy, rheumatism, gout, repeated colds and attacks of indigestion. These were met by Fagon with the simple remedies in vogue during the age, never forgetting the customary purgation and blood letting. During the last year of the life of the King there is little mention in the *journal de la santé du roi*, which was carefully kept by Fagon, of any circumstance which might lead to the suspicion that the King was in anything save normal health. Fagon has been criticized for this but it must be taken into account that this journal was read by the King and that perhaps a frank expression of opinion would have been injudicious under the circumstances. The court did not fail to find fault with Fagon for this and for the fact that he did not admit that his royal patient was in any danger. Madame de Maintenon stoutly upheld her protegé against the attacks of the courtiers as was natural in one who did not wish to see any diminution in the health of her royal protector.

In August, 1715, Louis returned to the court at Versailles complaining of pain in the left thigh and leg which was pronounced a sciatica by Fagon. This was, in effect, the beginning of the last illness of the King. Moved by the insistence of Marshall de Villeroy, Madam de Maintenon consented to a consultation which Fagon seems not to have objected to and Helvetius and Falconnet were called in as were later Dodart and Dumoulin and on the twenty-fourth of August, Fagon summoned the entire medical staff of Versailles as well as physicians from Paris and from Saint-Come. In spite of the efforts of this array of talent the King grew progressively worse and died the tenth of September from senile gangrene of the leg.

The autopsy showed "a gangrene of the blood of the legs" and nothing else abnormal, save an extreme dilatation of the stomach and intestines, which was attributed to the diet advocated by Fagon, a post-mortem effort to establish with him the responsibility for the King's death.

Fagon's materia medica was as simple as was that of any other practitioner of that age as is evident from the remedies set down in his journal of the King's health.

For an attack of rheumatism he prescribed: Pulpe d'oseille, (sorrel), Pulpe d'oignon de lys (lily bulb), Saindoux (lard) and also a mixture of mallow, marshmallow, the bulb of a lily, hemlock and camomile. As an application for carbuncle, tincture of Veronica and of Sage, and also a combination of litharge, reduced iron, turpentine and olive oil. And ever and always there was the blood letting knife and the basin and rhubarb and senna.

It is not for us, with more enlightenment to say that these leeches of a long past time did not do all in their power to render the condition of the sick less miserable and we must "account to them for righteousness" that he who acceded to the post of King's physician was bound by and presumably lived up to an oath of office which read as follows:

"You promise and swear in the presence of God to well and faithfully serve the King in the office of royal physician to which the King appoints you; to use in this position all skill and all knowledge of your profession and also all knowledge which you have of his temperament and physical condition. To receive no pay nor gift from any other monarch save only the King. To faithfully and carefully assure yourself that all the officers under your charge in this matter perform well their duties. Finally, you promise and swear that you will so acquit yourself as should a faithful and devoted subject of His Majesty."

In his duties as Court Physician Fagon had as a sharer in his responsibility for the King's health the Royal Surgeon and a staff of other medical men, phlebotomists and pharmacists. Furthermore, in the event of serious illness consultants were summoned from those eminent in the profession as is the practice in our own times.

Aside from being a healer to the King the court physician was much busied with preventive medicine, so far as the welfare of his royal charge was concerned and had an advisory voice in the routine of his life, his goings out and comings in, his diet, exercise and clothing and personally superintended all matters of this nature. He was one of those who woke the King in the morning and of those who put him to bed at night. He attended him on his return from his walks or his hunting and helped to rub him down and put him in fresh clothes. He was subject, as everyone else in court life to the rigorous routine of the life of the palace and his own leisure was secondary to his duties to his royal patient. As will be remembered, the superstition of the King's Touch was in existence at this time and it fell to the duty of the court physician and surgeon to supervise this function. The King touched for scrofula at the important religious fete days of the year, six or seven in number and this was announced from all the churches. There were many who held faith in the practice and records show that as many as two thousand were at a time the recipients of the royal remedy for their malady, not only native born French, but those who had traveled from other lands in search of relief from the disease. It fell to the lot of Fagon and his confrere Mareschal to separate the sheep from the goats and each one who applied for the intervention of the great Louis had first to satisfy these two judges that he was a proper subject for the miraculous healing. As each sufferer advanced before the king he knelt and Fagon and Mareschal held him by the head one on each side while the *Grande Monarque* with ungloved hand made the sign of the cross from forehead to chin and from ear to ear, at the same time pronouncing the ritualistic formula, "The King touches you and God will heal you."

In addition to his purely professional status the King's physician had by virtue of his appointment a distinct status in the court. Those of the medical profession were not, alas, even in those days regarded with the respect which was due them as men of science. The Princess of Conti, when weeping over the death of her physician, Denis Dodart, was asked by Louis XIV, "What sense is there in crying over the death of a servant and a doctor?" To which she replied, to her credit, "It is neither my servant nor my physician for whom I weep, but for my friend." In spite of the fact that the court physician was thus, by opinion, linked with domestic service his chains were in a measure gilded.

He had the title of Count which passed to his descendants and he had an appointment as Counselor in Ordinary to the King in both privy and State matters. He was the superintendent of the production of mineral waters and from the time of its beginning, the chief of the Botanical Garden. He exercised a very real authority over the other officers concerned with matters of the health of the personnel of the palace and they made oath of loyalty to him.

So far as the financial side of his life was concerned, he was well provided for. "He touched the treasury of the palace for three thousand *livres*" (Francs). He received by grant two thousand *livres*. For his food he was allowed three thousand *livres* and for housing and horses and carriage, sixteen thousand *livres*. As a State Counsellor he drew six thousand *livres* and finally four thousand *livres* in lieu of fees in connection with legal duty as witness. In addition to this it was not uncommon for him to be further rewarded by the King for special service.

Fagon was not of the Faculty of Medicine of Paris, although he was on good terms with the school. He was not bound by the precepts of this body in regard to the practice of his profession and did not hesitate to use whatever seemed good to him which came from the rival school at Montpellier. His employment of emesis was an example of this. As we have said before, bleeding and purgation were the mainstays of medical practice of this epoch; according to the current view the lack of perspiration was one of the greatest ills. Hecquet says that by this function is carried away in a day more waste material than by any other process of elimination: in anidrosis that the blood became charged with that which ought to be eliminated; that its volume in the body was increased and that there was a consequent extra tax on the heart which could only be relieved by bleeding. Hecquet voices the general opinion of the time which was dominated by the idea of a superabundance of blood in the body and he upheld the practice of free bloodletting by citing the fact that there were many animals which lived and thrived with a relatively small blood body content. Physiological chemistry of the time gave great importance in pathology to the presence of yeasts and ferments in the intestine. "Since we are poisoned when we are sick we have a remedy which is adapted to all forms of disease: purgation, which not only rids us of the offending substances but by reason of the nature of its action gives us the clearest knowledge of its result." It is with this fashion in mind that we must accept the long list of days of purgation of the King and the numerous phlebotomies which were practiced on his royal person. Any attempt to treat disease without recourse to these methods was subject to severe criticism as entirely heretical and we must make allowance for this in our reckoning of the methods which Fagon employed. His choice of purgatives was sane and sensible and he used quinine with judgment in treating febrile conditions in his patients. In the case of one Monsieur P. Beyle whom he was called on to treat, and who came to him with fever, frequent distressing cough and sero-purulent and blood tinged expectoration, he made a diagnosis of "withering, (*flétrissure*) of the lung" and while the record does not state whether the patient was bled or not, it is recorded that Fagon was insistent on the hygienic surroundings of his patient; that he should have abundance of fresh air, and not too cold: that he assured him sleep: that he put him on a rational diet, instituted diuresis and saw to it that there was free diaphoresis. Good nursing in fresh air and simple symptomatic remedies. It is not long since little more could be done in a case of pneumonia. So, though he purged and bled, according to prevailing rule, we must credit him with the sagacity to see and the courage to use measures which seemed advantageous irrespective of the school in which they originated.

So far as was possible, he restrained the excessive appetite of his royal patient, simplifying as much as he could the regime of the palace kitchen. He interdicted the use of champagne and also coffee. He insisted on regular exercise for the King, quarreled with him as to the use of tobacco and met his symptoms in the main, wisely and well, considering the status of medical knowledge at that time.

Eloy, in the monograph referred to in a previous footnote sums up his capabilities as follows. "It is evident that Fagon was an accurate observer: that he was a conscientious practitioner and well educated. That he was bound by the theories and customs of medicine of his time does not overshadow the fact that he was a notable scientist and that he had and held the confidence of many distinguished people of his time."

He died as the result of an operation for vesical stone, a condition of surprising frequency in his times, and it makes one a little thoughtful and a little more inclined to respect the fortitude of that generation when we recall that all surgical procedure was of necessity done without the relief of any anaesthetic.

The realization that medical skill in the seventeenth century, and the beginning of the eighteenth was so crude as the incidents quoted prove it to have been, and that it was still somewhat tangled in the skein of superstition gives one pause when we consider the degree of accuracy which has been built up since those days to lift it from the realm of guesswork to the plane of a true and accurate science.

James Robb Church.

ASSOCIATION NOTES

At a meeting of the Executive Council of The Association of Military Surgeons, November 1, 1920, the following names were proposed and elected to membership in the Association:

Medical Corps, U. S. Army—*Majors*

Arthur D. Jackson
William MacLake
Theron S. Langford
Herbert Clarence Neblett

First Lieutenant—Ramon Berrios

Medical Reserve Corps, U. S. Army—*Colonels*

Charles Lyman Greene
Edward G. Seibert

Lieutenant Colonels

Samuel A. Brown
Alexander Hamilton Placock

Majors

Kirby Dwight
Fleetwood Gruver
C. Zeno Holt
John Marion Hooper
Lora Douglas James
Otis Hackett Johnson
Alexander Blake MacNab
Stephen Charles Markley
Charles B. Matthews
Charles W. McClanahan
Floyd Willcox McRae, Jr.
Thomas Chalmers Myers
John Budd Nutt
Thomas William O'Reilly
Edward Osgood Otis
James Edwards Poore
Edwin G. Ramsdell
Henry Herbert Slater
Ralph Edwin Stevens
Carl L. Taylor
Sidney N. Trockey
Edward H. Vines
Thomas Edward Walker
Harvey E. Webb
Adrian Dallas Williams
John F. Wilson, Jr.
Jack Walter Witten
James Edward Wyant

Captains

William F. Acker
Alonzo Ray Adams
Cornelius J. Addison
Howson C. Bailey
Maurice Cohen
John Livingston Crofts
Paul Campbell Davis
Michael Ambrose Desmond
John Dimon
Floyd B. Dochternan
James H. Drake
John Atkinson Dunwody
Wilbert C. Hardy
Charles E. Holgate
William Llewellyn Howell
Fred M. Houghtaling
Frank H. Johnson
George Luther Johnson
Allen M. Baker
George T. Barcklow
Harry H. Bard
Ulysses Grant Bickell
Clarence W. Keene
Vincent Rockwell Killen
Emery W. King
William August Klingberg
Pere Moran Kuykendall
James Andrew La Gasa
Joel Cameron Land
William Lenetska
Sidney Mainer Lister
Frank Mikelsky Mikels
Stephen G. Mollica
Ernest Monroe Moore
David John Moore
John Henry Millin
D. O. Norton
General Grant Bragg
Daniel V. Catalano
John N. Chain
Reginald H. Cleary
John O'Brien, Jr.
Charles Edward Parker
Charles Merritt Pearce
Charles Herbert Perry
Edgar Everett Poos
M. Val Robinson
Irl C. Riggin
Edward A. Saltzman
James P. Schureman
Rezin Clark Shawhan
Anderson Lamb Smedley
John F. Smith
Egbert W. Sproule
Samuel Steele

Medical Corps, U. S. Navy

Lieutenant Commander

Thomas A. Fortescue

Lieutenants

Francis H. Lee
George Powers Quinn
George Lawrence White

United States Public Health Service

Passed Assistant Surgeons

Joseph A. Rene
Royd R. Sayers
R. R. Spencer

Assistant Surgeons

Saul Woldenberg

First Lieutenant, Medical Corps, Massachusetts, National Guard

Waldo Webster Walker

Major, Medical Corps, Washington National Guard

Clarence P. Gammon

Associate Member

Captain, Medical Administrative Corps, United States Army

Samuel Smelsey

COMMENT AND CRITICISM

REVIEW OF THE BACTERIOLOGY AND PATHOLOGY OF 29 CASES OF PNEUMONIA COMING TO AUTOPSY IN A MILITARY HOSPITAL

By Major WM. H. BAILEY, M.C., and First Lieut. H. R. LIVESAY, M.C.
Wesley Hospital, Oklahoma, Okla.

Of the many opportunities for observation that came up in the military hospitals during the war none were more interesting than those presented by the pneumonias.

The observations of Cole, McCallum and others in the States at the various Cantonments and Base Hospitals impressed upon our minds, soon after we entered the war, the importance of the streptococcic pneumonias. The fatalities from pneumonia following or accompanying influenza during the epidemic of 1918 in this country and the A. E. F. gave opportunity for more extensive and intensive study of this disease.

During the first months of 1919 in the A. E. F. although there wasn't a true wide-spread epidemic of pneumonia, the pneumonia wards of the various hospitals were usually the heaviest services and it was here that the largest percentage of deaths occurred.

The review of this short series of cases is given not with the idea that anything new is to be added but merely that this data may be recorded and added to the already large collection of notes that have been published.

All of our cases had been clinically diagnosed lobar or bronchopneumonia. Our observations were confined to the pathological conditions that were found at autopsy and the examination of smears and cultures taken at the post-mortem table. With the exception of sputum examination, cultures and typing, no reference is made to the clinical symptoms or laboratory findings during life.

The several charts that follow need but little explanation and the few points that we wish to emphasize will be taken up in our conclusions.

Chart I.—Clinical diagnosis of type of pneumonia.
Lobar, 9. Broncho, 20.

Chart II.—Pathological diagnosis of type of pneumonia.
Lobar, 0. Broncho, 15. Combined, 14.

Chart III.—Lobes involved—

	Right lung			*Left lung*	
	Upper	Middle	Lower	Upper	Lower
Lobular	25	23	22	25	21
Lobar	3	3	7	1	2

(Some cases of broncho-pneumonia showed lobar involvement but there were no cases that were diagnosed lobar clinically that did not show some lobular involvement.)

Chart IV.—Bacterial type of pneumonia from sputum examination.

Pneumococcic, 8.
Hemolytic streptococcic, 19.
Unclassified and mixed, 2.

(One of the cases showed influenza bacilli associated with type II pneumococci, another was associated with hemolytic streptococci. In one case type II pneumococci were associated with hemolytic streptococci. In one case tubercle bacilli were associated with hemolytic streptococci.)

Chart V.—Types of pneumococcic cases, according to sputum.

Type	I	II	III	IV
Cases	1	5	2	0

Chart VI.—Cases showing complications—

Empyema, right, 5; left, 5; bi-lateral, 6.
Pericarditis, 9.
Sinus involvement, 1.
Meningitis, 1.
Miscellaneous, 6.

Chart VII.—Empyema according to kind of bacteria—

Pneumococcic, right, 2; left, 0; bi-lateral, 2.
Hemolytic streptococcic, right, 3; left, 5; bi-lateral, 4.

Chart VIII.—Pericarditis with empyema according to kind of bacteria.

Pneumococcic, right, 1; left, 1; bi-lateral, 1.
Hemolytic streptococcic, right, 2; left, 2; bi-lateral, 2.

Conclusions.—Clinically the broncho-pneumonias were more than twice as frequent as the lobars.

Pathologically they were all broncho-pneumonias, about one-third being so conglomerate as to give the clinical symptoms of the lobar type.

The upper lobes on both sides were slightly more frequently affected than the other lobes.

The hemolytic streptococcus either alone or associated with some other organism was found to be the causative factor in about 68 per cent of the cases.

Of the eight cases due to the pneumococcus, type II was found in 62.5 per cent in the sputum.

All pneumococcic cases showed a lobular type of infection in one or more lobes.

Empyema was the most frequent complication and appeared about equally on each side and bi-laterally.

Pericarditis was the next most frequent complication.

Hemolytic streptococcus was the most frequent organism found when complications were present, both when empyema occurred alone and when it was associated with pericarditis.

We also noted what has been mentioned in the literature by several workers, that as the number of streptococcic cases diminished the proportion of pneumococcic cases increased. Also when the pneumococcic pneumonias became more prevalent the percentage of mortality was markedly reduced.

Some points are worthy of note in the routine examination of sputum in the pneumonias; first, a capsule stain, this is one of the most important factors in the preliminary examination; second, when you get hemolysis you are not safe in saying hemolytic streptococcus until you have ruled out other organisms producing hemolysis as the staphylococcus and some saprophytes; third, a T. B. stain should always be made on every sputum. So all specimens of sputum must have a carbo-fuchsin, a Gram's and a capsule stain as a preliminary. These give a definite picture at once, and you can get some idea of the nature of the infection and can act accordingly. It is almost useless to attempt to get a pneumococcus type when it is not the predominating causative factor producing the disease.

Note.—The data for this article was collected and the work done at Base Laboratory, A.E.C., Le Mans, France, the cases coming to autopsy at Camp Hospital 52, during the spring of 1919. It was planned to submit this for publication at that time but our being returned to the United States interrupted this. We are offering it at this late a date because we feel that any notes on this interesting and still unsolved subject should be made a matter of record in the literature.

PLASTIC REPAIR OF DEFECT FROM REMOVAL OF EPITHELIOMA NEAR INNER CANTHUS

E. H. C., age 33, service 6 years, admitted May 9, 1920. Normal physically except for chronic ulcer left cheek about two inches by one-half inch in size commencing just below inner canthus left eye and extending obliquely downwards and outwards with a deep depressed center and a firm raised border, hard to the touch. Duration one year. Thorough antisyphilitic treatment had been carried on for three months with no effect on the lesion. Diagnosis of epithelioma was made and immediate excision advised.

Operation, May 11. The ulcer was excised in its entirety with good margin of clear skin and reaching well below the growth. The large defect produced was filled by plastic operation on the cheek. Incision was carried horizontally along the lower edge of the orbit keeping clear of the orbicularis muscle. In the temporal area a verticle V-shaped excision of skin was made. The lower incision line for the flap was carried down across the cheek and a V-shaped excision of skin made over the chin below and to the outer side of the mouth. The entire flap was then freed and dissected well back to the neck keeping the entire thickness of skin fat and superficial fascia. The flap was then brought forward and upward to fill the defect closing the arms of the two V's above described. By this means the flap had been advanced over about one-half of the defect to be covered. Tension sutures were introduced along the lower border of the flap obliquely from the nasal tissues down to the flap so as to produce a progressive lift with each stitch, until the entire defect was closed and all tension taken up by these sutures on the nasal side of the flap. The upper line of incision was then carefully approximated just as the tissues lay so that no tension was exerted on the tissues of the lid. Healing occurred by first intention and stitches removed gradually between the fifth and ninth day. After allowing three weeks for consolidation of the wound, massage and electrical treatment was given over the scar area and during the next two months the super abundance of tissue which was at first present smoothed down to form a fine balance to the appearance of the other side of the face.

To avoid the ectropion which commonly follows operations for removal of tissue in the vicinity of the eye and particularly at the inner canthus, it is essential that sufficient tissue be introduced into the defect to fill it without any tension on the tissues of the lid. Fortunately the skin near the base of the nose is firm and not very elastic. Tension can therefore be safely made on these tissues and thereby confine the strain entirely to a non-elastic tissue. The use of the V-excisions at upper and lower angles of the flap is useful in taking up the distant pull and strain of the platysma and neck muscles. The combination of these two features makes removal of tissue in this vicinity possible without production of the usual deformity following such procedure.

R. H. GOLDTHWAITE,
Major Medical Corps, U. S. A.

A MODIFICATION OF THE URETHRAL SOUND

Recently I noticed in cases of urethral stricture that it was easier to pass an urethral dilator with the dial reading 15 F. than to pass the regular sound of the same size. This I think is due to the extra weight of the dial and set screw.

To take advantage of this fact I cut a slit in an 8 oz. weight large enough to admit the flattened end of the sound. I have used this many times, and it seems to me that this additional weight on the end of the sound makes the passage easier, quicker, and safer, as the sound glides in under its own power. It is my experience that an increase of three or four sizes (F.) is gained by this weight.

The usual sound seems to me to be poorly balanced. By building them heavier on the distal end they feel better in the hand, and as all need of forcing is done away with, my patients at least, say they feel better in the urethra!

Addison H. Bissell, M.D.,
Former Captain, Medical Corps, U. S. A.

THE HISTORY OF THE ESMARCH BANDAGE

The triangular or Esmarch bandage was introduced by Professor Esmarch, of Germany, in the later '60s, and probably owes its inception to the first Geneva convention, which was held in 1864. A year or so later the bandage was adopted by the Prussian Government and was first used in the Franco-Prussian war. Every German soldier carried two of these bandages, one in his outside tunic pocket and one sewed to the inside of the tunic. Thus both German and French field surgeons and stretcher bearers could find them readily in field first aid work.

The popularity of the bandage naturally increased after the war. The demand for it was general, and as a result Professor Esmarch issued a diagram triangular bandage in the early '70s, showing no less than thirty-eight applications. One of the originals of this type, dated 1873, and of which there are but four in existence today is in the Red Cross Museum at Washington.

In 1880 the St. John's Ambulance Association, in England, issued a diagram triangular which was a marked advance over that of Esmarch since it had so many more suggestive illustrations showing the use of the bandage. The American Red Cross has issued a third diagram triangular which, in point of detail and suggestion, is a further improvement on that of the St. John's Association. In addition to the diagrams it contains typed instructions on what to do and what not to do in case of serious accident, as well as directions for performing artificial respiration. The ink on the bandage is strictly indelible, so that it may be actually utilized in case of emergency and repeatedly washed without losing its illustrations and suggestions.

A RESEARCH INFORMATION BUREAU

The National Research Council has established a Research Information Service as a general clearing-house and informational bureau for scientific and industrial research. This "Service" on request supplies information concerning research problems, progress, laboratories equipment, methods, publications, personnel, funds, etc.

Ordinarily inquiries are answered without charge. When this is impossible because of unusual difficulty in securing information, the inquirer is notified and supplied with an estimate of cost.

Much of the information assembled by this bureau is published promptly in the "Bulletin" or the "Reprint and Circular Series" of the National Research Council, but the purpose is to maintain complete up-to-date files in the general office of the Council.

Requests for information should be addressed, Research Information Service, National Research Council, 1701 Massachusetts Avenue, Washington, D. C.

REHABILITATION AND EMPLOYMENT OF DISABLED SERVICE MEN

The United States Civil Service Commission has announced that training assistants and placement assistants at $1,500 to $2,400 a year are needed in large numbers for the Rehabilitation Division of the Federal Board for Vocational Education, for employment throughout the United States, in order that the rehabilitation and employment of disabled soldiers, sailors, and marines may be facilitated.

The Civil Service Commission has announced examinations for these positions. Applicants will not be required to report at any place for a written examination, but will be rated upon their education and experience and upon theses or publications which are to be filed with the application. Applications will be accepted for an indefinite period.

The Commission urges qualified persons to make application for these examinations. Full information and application blanks may be obtained from the secretary of the U. S. Civil Service Board at the post office or customhouse in any city, or from the United States Civil Service Commission, Washington, D. C.

HEADQUARTERS, AMERICAN POLISH RELIEF EXPEDITION,
UNITED STATES ARMY, WARSAW, POLAND,
October 1, 1920.

The following named officers of the American Polish Relief Expedition were awarded the "Commemorative Cross" by the Polish Government in recognition of their services to Poland during the past year in the campaign against Typhus Fever:

Harry L. Gilchrist, Lieut. Colonel, M. C.; Lee R. Dunbar, Major, M. C.; Frank H. Dixon, Major, M. C.; Willis P. Baker, Major, M. C.; Paul H. Street, Captain, M. C.; Arthur E. Fox, 1st Lieut., F. A., Robert C. Snidow, 1st Lieut., C. A. C.; Harold L. R. K. Albro, 1st Lieut., Cav.; Alfred N. Bergman, 1st Lieut., F. A.

The presentation of the decorations took place in Warsaw on September 30, 1920, before a large military gathering, the decorations being received by the Commanding Officer with a few fitting remarks.

The American Polish Relief Expedition, which is the first organization of its kind in the history of the United States Army was ordered to Poland in August, 1919 for service not to exceed four months, but the service has since been extended on two occasions. It will soon leave for the United States and the work which it organized and planned will be carried on by Polish personnel.

During the trying times when Warsaw was threatened, the members of the

Expedition did valuable service, both in assisting the Polish Government and American Institutions. Armed guards for the American Legation and American Consul were furnished by members of the Expedition.

During the stay of this organization its members have been distributed all over Poland, attached to the different Polish Sanitary organizations. As a result many American principles have been adopted by the Polish Sanitary organizations which it is believed will be of material benefit to the Government.

During the stay of the Expedition, one officer Lieut. Colonel E. C. Register, M. C., U. S. A., and two enlisted men, Cook Smith Grindstaff and Private Clarence M. Burns, sacrificed their lives while performing duties for the benefit of Poland.

Over forty commissioned officers and five hundred enlisted men have been affiliated with the Expedition in Poland. The work started by this organization will be continued by Polish personnel, thus assuring the carrying on of the campaign as originally planned.

THE INTERNATIONAL CONGRESS OF MILITARY MEDICINE AND PHARMACY

The Medical service of the Belgian Army is arranging an international Congress of Military Medicine and Pharmacy for the month of June, 1921, at Brussels to which are invited all medical officers and pharmacists who are now attached or have been attached to the armies of the Allied or neutral nations.

At the end of the great struggle, which disturbed the peace of nations during the years from 1914 to 1918, it is of interest to review the work of the different military medical services and compare one with another the different results obtained; it is also of importance to note the advances of military medicine during war time with a view of reducing them to a practical basis for future use.

The following subjects have been placed on the program for this Congress:

1. The lessons of the war in the treatment of fractures of the limbs.
2. The measures taken in the armies against tuberculosis and venereal disease.
3. Chemistry and the physiology of war gases; the sequellae of their action on the body; the importance of the sequellae as regards the future of those affected by it.
4. General organization of the medical services of the different armies.

Registration for this Congress, as well as communications and reports concerning the different subjects should be forwarded not later than the first of April, 1921, to the General Secretary of the Congress Captain Jules Voncken, Military Hospital, Liege, Belgium. Papers forwarded should be accompanied by a brief abstract of their contents.

INSTRUMENTS AND APPLIANCES

THE FRANK W. McGUIRE RIB SPREADER

By DR. FRANK W. McGUIRE,
Buffalo, N. Y.

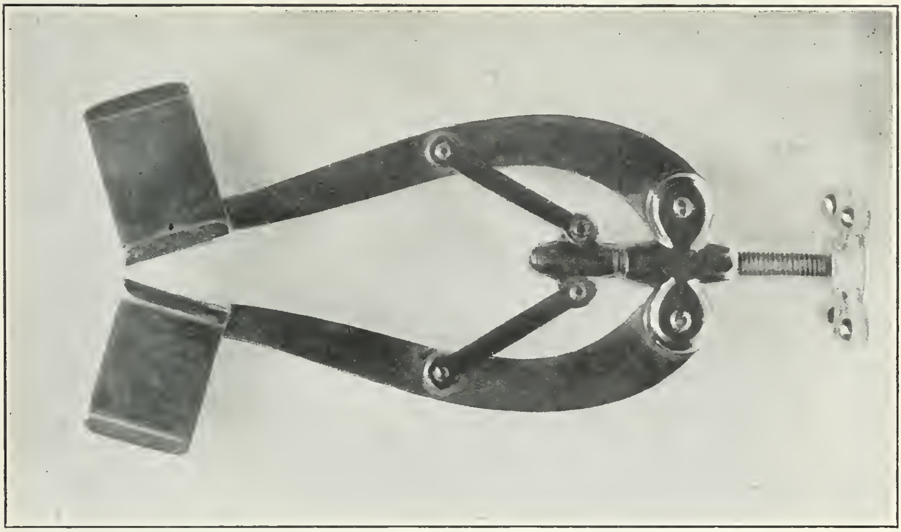
(With three illustrations)

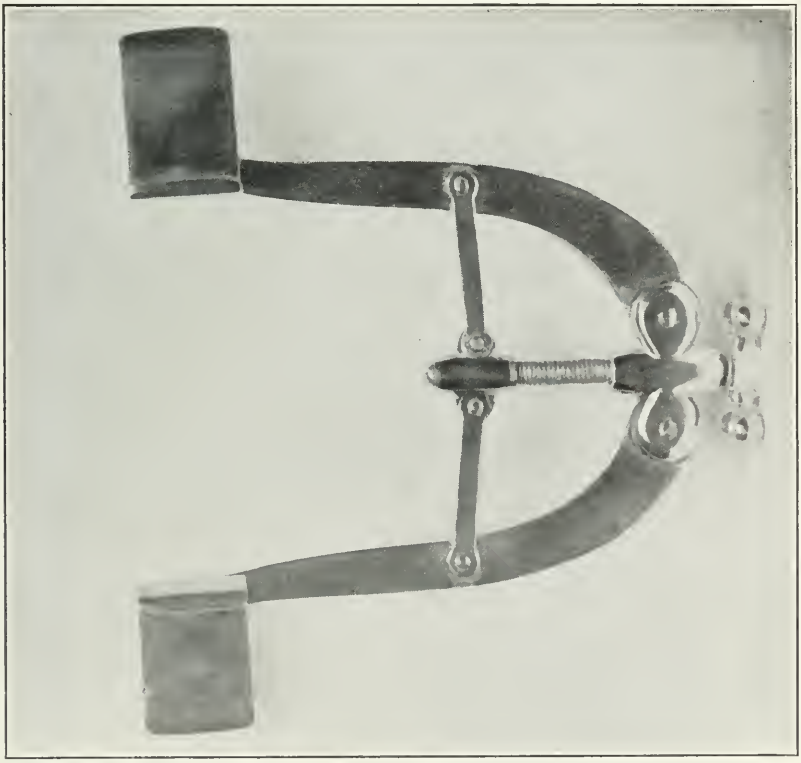
Our knowledge of lung pathology has markedly increased in recent years and, with this increased knowledge, operations on the chest have become more numerous and difficult. When one is compelled to do work inside the chest wall, in order that the operation shall not be deforming, it is necessary to use a powerful, self-retaining retractor. By the use of this retractor it is unnecessary to remove more than one or two ribs.

On account of the necessity of such an instrument in connection with my work on the chest I designed the accompanying retractor. With this instrument it is only necessary to remove five or six inches of the sixth or seventh rib in order to be able to introduce the hand into the chest or perform operations within the chest.

I might add that I have experimented with several types of rib retractors and have found this one to be the most satisfactory.

I have also found this instrument to be very useful in abdominal operations where a self-retaining retractor is required.





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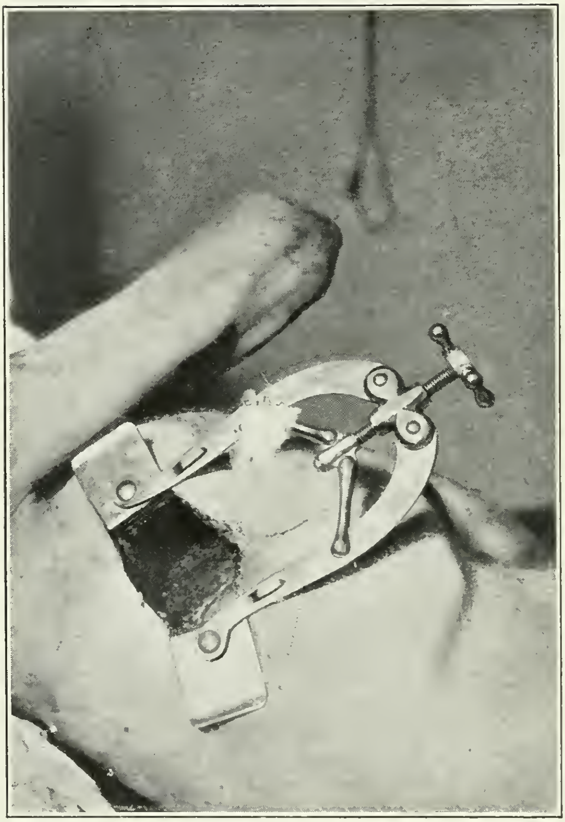


BOOK REVIEWS

Diagnostic Methods. Chemical, Bacteriological and Microscopical. A Text-Book for Students and Practitioners. By Ralph W. Webster, M.D., Ph.D. Sixth Edition, Revised and Enlarged. With 37 Colored Plates and 170 Illustrations, p. i-xl, 1-844. Philadelphia: P. Blakiston's Son and Co., 1920.

In this, the sixth edition of this standard work upon Diagnosis, the writer has incorporated a large amount of new material which has necessitated a practical rewriting of the book, so that it stands to-day as probably the most comprehensive work upon the subject by an American author. Among the new methods included in this edition may be mentioned the various methods of Folin and his co-workers upon the determination of ammonia, nitrogen, urea, and sugar in the urine; Folin and Wu's system of blood analysis; much new material regarding functional renal diagnosis; the relation of hydrogen-ion concentration to blood and urine analysis; the coagulo reaction in the diagnosis of syphilis, and other methods of recent development.

The descriptions of the parasites considered and the methods for their detection are excellent, although in some instances almost to brief as regards morphology and cultural characteristics, but they are remarkably free from inaccuracies, which cannot be said of many of the brief descriptions of parasites given in modern text-books on diagnosis. The descriptions of the various diagnostic procedures employed in the examination of the sputum, gastric cont[illegible], feces, urine, blood, and transudates and exudates are very full and for that [illegible]n will be found most valuable to the student and practitioner, as well as to the [illegible]oratory worker. It is to be regretted that the author did not describe in *extenso* the complement fixation test for tuberculosis and the results which may be expected from it, as recent researches have shown that this is a valuable adjunct to our diagnostic resources in tuberculosis. The Wassermann test is fully described and the entire section upon serum reactions can be recommended as a conservative and accurate consideration of a most important subject.

A very valuable feature of the work is the bibliography which accompanies the description of the subjects considered. Many hundreds of references are given, arranged in such a way as to prove of greatest service to the student, and this feature of the book is to be commended, as it enables the reader to consult, if he desires, the most authoritative literature upon any special subject connected with laboratory diagnosis. All in all, the book is an excellent one and can be honestly recommended to students of medicine, practitioners, and laboratory workers.

The press-work is good and there are remarkably few typographical errors, while the illustrations are all that could be desired.

Chas. F. Craig.

Syphilis. Diagnosis and Treatment. Lloyd Thompson, Ph. B., M.D. Second Edition, Thoroughly Revised. 81 Engravings and 7 Plates. Philadelphia and New York: Lea and Febiger, 1920. Price, $7.00.

The second edition of this work upon syphilis by Thompson contains a considerable amount of new material which has appeared in the literature since the publication of the first edition, and the section upon visceral syphilis has been practically rewritten. The work, as it at present stands, is an excellent presentation of the subject and the author is to be congratulated upon the conservative manner in which matters which are still in controversy are presented and the common-sense position which he takes concerning them. It is evident that much of the material presented, and the conclusions arrived at, are results of personal experience, and that, while the literature of the subject is thoroughly reviewed, the author's standpoint is not that of the medical librarian but of the practicing physician.

The chapters devoted to etiology and laboratory diagnosis are especially good, and the methods of demonstrating *Treponema pallidum* and the various modifications of the complement fixation test for syphilis are fully considered. The colloidal gold test and the examination of the cerebro-spinal fluid are accurately described and their importance in the prognosis and early diagnosis of lesions of the central nervous system emphasized.

The chapter upon the treatment of syphilis is one of the best in the book, owing largely to the detailed descriptions of the methods of administering mercury and arsphenamine. The author's discussion of the relative value of mercury and arsphenamine is eminently judicial and after reviewing fairly the evidence both for and against the value of mercury in the treatment of the disease, Thompson concludes: "that while there is no doubt as to the superiority in some respects of arsphenamine over mercury in the treatment of syphilis, the latter drug certainly has a place in the therapy of this disease and should be used in practically all cases."

Nearly one-half of the book is devoted to the consideration of visceral syphilis and this section is a mine of information, each organ being considered separately and the literature covering the subject thoroughly reviewed. Syphilis of the nervous system is well considered and the recent work of Warthin and other authorities regarding the early involvment of the central nervous system in many syphilitic infections is noted. The author states that "The standard for cure of a case of syphilis showing central nervous system involvment consists of a constantly negative spinal fluid as well as a negative blood Wassermann without any increase in symptoms for a period of at least two years following the last treatment."

The book is well printed and illustrated but the plates illustrating the Wassermann reaction and the colloidal gold test could be improved upon with advantage.

Chas. F. Craig.

The Link Between the Practitioner and the Laboratory. A Guide to the Practitioner in his Relations with the Pathological Laboratory. By Cavendish Fletcher, M.B., B.S., London, M.R.C.S., L.R.C.P. and Hugh McLean, B.A., B.C., Canterbury, D.P.H., Cambridge, M.R.C.S., L.R.C.P. New York: Paul B. Hoeber. 1920. Pp. 1–91. Price, $1.50.

The object of this valuable little work is to give the practitioner of medicine information regarding the value of the laboratory to him in his practice. The first part of the book contains an alphabetical list of those diseases in the diagnosis, treatment, and prognosis of which the pathologist can be of assistance, and after each disease the diagnostic or other tests are indicated with instructions as to what material should be collected, how and when to obtain it, and how to send it to the laboratory. There is also indicated within what period of time a report from the pathologist may be expected. A careful survey of this part of the book shows that it has been scientifically collated and it is believed will prove most useful to the general practitioner

The book also contains a list of the apparatus needed by the practitioner for collecting and sending specimens to the laboratory, and clear and concise directions for making blood examinations, and collecting blood for bacteriological and serological tests. Chapters are also devoted to directions for the collection and transmission of material from venereal lesions, sputum, faeces, gastric contents, urine, and the collection of milk and water for laboratory examinations. The work concludes with a short but reliable chapter upon therapeutic inoculations in which vaccines and immune sera are briefly considered.

As the authors state: "This is not a work on pathology, but, roughly speaking, a mere index" intended to enable the practitioner "to send to the pathologist the right material in the right way," but it contains a mine of valuable information and should prove of real practical value to the practitioner who desires to give his patients the benefit of laboratory procedures in diagnosis and treatment.

CHAS. F. CRAIG.

THE PATHOLOGY OF INFLUENZA. By M. C. Winternitz, Isabel M. Wason and Frank P. McNamara. Illustrated with Fifty-five plates. New Haven, Conn.: Yale University Press, 1920.

This work is the outcome of the study, by the authors, of the abundant material furnished by the great epidemic of influenza that occurred in this country in 1918. The authors investigated very thoroughly the pathology, both macro-, and microscopic, of 82 fatal cases occurring under their observation, and the results of this study are given in the beautiful work under review.

The work is divided into seven parts dealing with the pathology of the respiratory tract in influenza; lesions observed in the lung; influence of the respiratory complications of influenza upon tuberculosis of the lung; extra-respiratory lesions in influenza; a comparison of the respiratory lesions of influenza and those produced by the inhalation of poisonous gases; peculiarities of the histology of influenzal pneumonia; infection as a possible etiological factor in the genesis of malignant new growths; and the bacteriology of influenzal pneumonia.

The pathology, both gross and microscopical, of the various types of pneumonia met with as complications of influenza is very thoroughly considered and illustrated with excellent colored plates and drawings. In a series of 95 autopsies upon persons dying of influenza they saw two examples of activation of an old tuberculous focus by the acute respiratory process present and in both the pulmonary tubercular process was acute and contributed markedly to the fatal outcome. An interesting lesion frequently observed was the lining of the alveoli by newly formed cubical cells, and in a number of cases "epithelial proliferation has been so extensive that it could not be differentiated histologically from an invasive, malignant neoplasm" and the authors suggest that there may be an increase in the rare epithelial new growths in the respiratory tract of man as a result of influenzal infection.

From their studies the authors conclude that the etiology of influenza is unknown and that the portal of entry of the inciting cause is undetermined. They consider that the respiratory lesions are dependent primarily upon the damage produced by the true etiological agent and only secondarily by invasion by the bacteria present in the mouth or in inspired air.

The work is a very suggestive one and is worthy of careful study. The press work is excellent and the illustrations among the best that the reviewer has seen. It is interesting to note that the authors give credit to the assistance furnished by officers and men attached to the Yale Army Laboratory School, at that time established at Yale University, under the Laboratory Division of the Surgeon General's Office, and the paintings and drawings illustrating the work were mostly prepared by artists enlisted in the Medical Department of the Army.

CHAS. F. CRAIG.

PRACTICAL DIETETICS WITH REFERENCE TO DIET IN HEALTH AND DISEASE. Alida Frances Pattee. Thirteenth Edition. Mount Vernon, N. Y.: A. E. Pattee, publisher. 1920.

This, the thirteenth edition of this well known book which was first brought out in 1903 is in this edition brought up to date and maintains the high standard set from its first appearance. It is thorough, practical and combines with the recipes explanations of the fundamental facts of alimentation and digestion which are understandable to those for whom the work is prepared. Many new diets have been added to those contained in former editions and notation made of late research in dietetics. With the book is sent pamphlet containing the Dietetic Standard Curriculum for Schools of Nursing prepared by The National League of Nursing Education and also the dietetic requirements of the various State Boards of Examiners for Nurses and their State examination papers.

The work is too well known to need extensive notice. It is attractive in appearance and should, as the former editions have, be valuable wherever instruction in dietetics is featured.

MEDICAL WAR MANUAL NO. 8. Military Surgery of the Ear, Nose and Throat. By Hanau W. Loeb, M.D., Major Medical Reserve Corps, U. S. Army. Philadelphia and New York: Lea & Febiger. Pp. 176, Price, $1.25.

A book in tabloid form. It contains much valuable information and indicates close study of the subject.

Of particular interest is the comment at the end of each chapter, in which the author gives his gleanings from the various writers consulted.

There is appended an extensive reference list of the literature of the subject in English, Italian, French and German. MAJOR T. E. OERTEL, M.C., U.S.A.

THE SCHOOL OF SALERNUM; REGIMEN SANITATIS SALERNITANUM. The English version by Sir John Harrington. With a history of the School of Salernum by Francis R. Packard, M.D., and a note on the prehistory of the Regimen sanitatis by Lieut. Col. F. H. Garrison, M.C., U. S. A. 1920. New York: Published by Paul B. Hober. Price, $3.75.

This little book is of interest to those who have time for the curiosities of medicine. There is, in Dr. Packard's introduction, a history of the school at Salernum, an ancient town some thirty-five miles southeast of Naples and which existed as a Roman colony as early as 194 B. C. Situated in a salubrious climate it was a health resort and under monastic rule miraculous cures were attributed to it. Later, the school grew up, a rude prototype of those afterwards at Paris and Montpellier. Women as well as men were educated there in medicine and Costanzella Calenda, Abella and Rebecca Guarnia, as well as others, have left written treatises on medicine. The best known product of this school was the "Schola Salertina," or "Regimen Sanitatis Salernitanum," which was, as were many other treatises of those days, printed in verse. It was really a handbook of domestic medicine, and intended for the laity rather than for the medical profession. It was written as a work of medical advice for Robert, Duke of Normandy, eldest son of the Conqueror, and was spread abroad prior to the time of printing by many manuscript copies. Several of these are in the Bodleian Library at Oxford and, as is the case with written copies, the text in them varies considerably.

The English text reproduced in this work is that of Sir John Harrington (who was a typically Elizabethan courtier) and was published in 1607. Colonel Garrison gives a clear and comprehensive critique both of the school at Salernum and of the "Regimen" in the chapter which precedes the reproduction of Harrington's text.

The book is up to Hoeber's usual standard in regard to paper and print.

James Robb Church.

The Surgical Clinics of Chicago, August, 1920. Volume 4, Number 4; published by W. B. Saunders Company, Philadelphia and London.

The August issue contains the usual number of excellently presented, well-illustrated, instructive Clinics. There are eighteen contributors. Among the many excellent articles, Eisendrath contributes one upon "The Anatomic Varieties of Prostatic Hypertrophy"; Carey Culbertson contributes a valuable article on "The Management of General Pelvic Peritonitis," and particularly to be commended is his method of peritonization of the pelvis after radical operations for general pelvic peritonitis. His method is similar to that described in a monograph by Henri Judet of Paris. We must however, credit Sneguireff (Revue de Chirurgie, September, 1899) with giving to the profession the first detailed account of autoplastic work. This method was also described and illustrated in an article published later by the reviewer, in Surgery, Gynecology, and Obstetrics, August, 1911. Bevan makes several contributions in his usual clear style. Ochsner describes an interesting operation for an endothelioma of the brain. Among several other interesting papers is one by Kanavel on "Tumors of the Face." Kolischer and Eisenstaedt in their Clinic report two cases; *one* a "Papilloma of the Bladder," and the *other* illustrating the "Muscle-splitting Incision for Exposure of the Kidney." Among the remaining interesting clinical reports may be mentioned that of McWhorter on "Advantage of the Elevated Double Inclined Plane in the Treatment of a Fracture of the Lower Third of the Femur." It is an interesting volume.

Jno. E. Summers.

Chirurgie Reparatrice et Orthopedique, by Messrs. Jeanbrau, Nove-Josserand et Ombredanne: Associate professors in the Colleges of Montpelier, of Lyon, and of Paris. Edited by P. Desfosses, surgeon of the British Hospital of Paris. Two volumes, 8vo., forming together 1,340 pages, with 1,040 illustrations. Masson and Company, publishers. Price 80fr. net.

In their announcement the publishers of these volumes claim that this work is designed for civil practice and particularly for the surgical treatment of industrial accidents. They say it is not a treatise on war surgery from a retrospective point of view, and it is claimed to be the first and only treatise appearing in French, and in the world, in which the surgical achievements of the last years are applied to the treatment and the reparation of major traumatisms and their sequellae, viz., accidents of industry, street accidents, crushing of extremities in their many forms, etc. They emphasize the fact that in the surgery of the late war there was a multiplicity, a variety, and a complexity of traumatisms such as in no country or time in history had ever been seen or approached. They call attention to the fact that it is indispensable that the experience acquired in the course of a war which had resulted in the destruction of more than seven million human beings should not be lost to humanity, and should be conserved for the surgeons of the future. Surgery cannot forget in time of peace the progress realized during the war. It cannot content itself with old, pre-war ideas. A new surgery ought now to be applied to all the therapeutics of industrial accidents and accidents of the street. Industry of today employs new and formidable instruments—heavy artillery—in works of peace. The functioning of new engines produces terrible accidents quite different from accidents of former times. The severe crushing of extremities by machinery, trucks, aeroplanes, demands intervention as early and as judiciously carried out as do wounds from exploded shells.

To show the kind of surgical repair required in late results of traumatisms upon the different systems of the economy, to indicate the apparatus which can supply the definite deficiencies, such is the subject of this "Treatise of Reparative and Orthopedic Surgery."

The book is divided into two parts: part one—the *general*—treats of the principles of the technique of repair and the special rules for construction of apparatus. The second—or *special*—part treats of the head and neck, the thorax, the spine, the abdomen, etc., emphasizing the general principles of surgery and of orthopedics. These two parts are divided into a large number of other parts, in sixteen different chapters written by men whose names are universally known in medicine and surgery. Forty-eight collaborators have assisted in the preparation of this important work which is abundantly illustrated. This work is of such a voluminous character that it would be impossible in a limited space to even epitomize the vast field covered. There is no injury of the head, trunk and extremities, with its possible consequences, that is not carefully considered, and from a therapeutic point of view the work is most valuable both to the general surgeon and to the orthopedist. The meat of the book is not hidden by theoretical considerations.

JNO. E. SUMMERS.

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY (LEGISLATIVE AND ADMINISTRATIVE HISTORY), DURING THE PERIOD OF THE REVOLUTION. 1776–1786. Compiled and edited by Colonel William O. Owen, U. S. Army, Curator. Army Medical Museum, Washington, D. C. New York: Paul B. Hoeber, 1920.

Colonel Owen in this collection of excerpts from the Journals of the Provincial Congress of Massachusetts Bay and from the Journals of the Continental Congress has gotten together much data interesting from a historical standpoint in regard to the development of the Medical Department of our Army. It shows from what modest beginnings the present structure sprung and the contrast between the conditions of those early days with what is existent at the present time gives us an idea of the growth of medical and administrative methods in this branch of the service.

It might appeal to some of those who go along the devious path leading to commission to know that in colonial times an examination of four hours was the ordeal which had to be met to determine the fitness of a candidate for service with the Army. Pay in those distant early days would have left a more startling hiatus between plus and minus than exists to-day if it had not in the meantime been added to. An Act of July 27, 1775, provides a scale of pay in which the Director General gets four dollars a day, Surgeon's Mates, (Regimental Surgeons) two-thirds of a dollar and the poor nurse, two dollars a month! What do you suppose she did with it all?

It is interesting to note on page 91 in the act of January 6, 1778, the following which would seem the precursor of recent legislation.

"*Resolved,* that the sum of ten dollars shall be paid by every officer, and the sum of four dollars by every soldier, who shall enter, or be sent into any hospital to be cured of the venereal disease; which sums shall be deducted out of their pay, etc."

The book is attractively gotten up and while too statistical for continued reading is valuable for the student of military medicine as a work of reference.

INDEX

Volume XLVII—December, 1920.

1. Original Articles are indicated by (*).
2. Reprints and Translations by (R. & T.).
3. Editorials by (Ed.).
4. Correspondence by (Cor.).
5. Current Literature by (C. L.).
6. Reviews by (Rev.).
7. Comment and Criticism by (C. & C.).
8. Obituary by (Obit.).
9. Clinical Notes (C. N.).
10. Instruments and Appliances (I. & A.).

A

Activities of the American Expeditionary Forces in the Zone of the Armies, Medical. Col. A. N. Stark, M. C., U. S. A. *151
Air Service Since the Signing of the Armistice, Operation of the Medical Division of the. Col. Albert E. Truby, and Maj. John Dibble, M. C., U. S. A. *67
Air Service Medical Association .. (C. & C.) 115
Allison, J. Richard, Lieut., M. C., U. S. N. Report of a Case of Ruptured Urethra with Fractured Pelvis *321
Ambulances Observed Abroad, Types of Motor. Capt. F. L. Pleadwell, M. C., U. S. N. *331
Amebae Living in Man, The ....(Rev.) 125
American Red Cross in Italy, the Story of (Rev.) 728
American Red Cross at Lyons: A Campaign for the Childhood of France, The *543
American Red Cross in the Meurthe-et-Mosell, The *544
American Red Cross Assistance to the United States Medical Department in the United States, The. Lieut. Col. C. H. Connor, M. C., U. S. A. *232, *407
Anatomy, The Principles of ....(Rev.) 488
Anesthesia, Regional ....(Rev.) 489
Arsenic Preparation in the Treatment of Syphilis, Use of ....(C. & C.) 116
Ashburn, P. M., Col., M. C., U. S. A. Factors Making for a Low Venereal Record in the Army of the United States *208
Association Notes 356, 483, 615, 712
Attending Surgeon's Office, History of the Activities of. Col. R. F. Metcalfe, M. C., U. S. A. *532

B

Bailey, Maj. William H., M. C., U. S. A. Review of the Bacteriology and Pathology of twenty-nine Cases of Pneumonia Coming to Autopsy in a Military Hospital (C. & C.) 713
Bainbridge, Wm. Seaman, Comdr., M. C., U. S. N. R. F. Physiotherapy at the U. S. Naval Hospital, New York, N. Y. ..*261
Billings, Frank, Col., M. R. C., U. S. A. Modern Military Medical and Surgical Reconstruction and the Measures of Coöperation Practiced by the Medical Department of the Army and Federal Board for Vocational Education *1
Bissell, Addison H. Capt., M. C., U. S. A. A Modification of the Urethral Sound (C. & C.) 716
Blair, Vilray Papin, A. M., M. D., F. A. C. S. Some Observations on our War Experience with Face and Jaw Injuries *379
Books Received 357, 489, 618, 729
Boone, Joel T., Lieut. Comdr. M. C., U. S. N. Morale in Naval Hospitals *268
Bradbury, Samuel, Capt., M. C., U. S. A. The Recurrence of Influenza in a Regiment *471
Braisted, William C., Rear Admiral M. C., U. S. N. Commissioned Service in the Navy as a Vocation for the Medical Man. (Ed.) 348
Buckstein, J., 1st. Lieut., M. C., U. S. A. An Apparatus for Duodenal and Intestinal Feeding and Therapy Transduodenal Lavage, and Proctoclysis and the Administration of Sterile Solutions (I. & A.) 118
Burnside, P. A. Surgeon L. A., U. S. P. H. S. Note on the Value of Prophylactic Vaccination Against Pneumonia *589

C

Catarrhal and Suppurative Diseases of the Accessory Sinuses of the Nose, The (Rev.) 357
Children, The (For the Children of Paris) ...*539
Chirurgie Reparatrice et Orthopedique (Rev.) 725
Church, James Robb, Col., M. C., U. S. A
  Lest We Forget ....(Ed.) 247
  Tempora Mutantur et Nos Mutamur in Illis ....(Ed.) 479
  The Interallied Surgical Conference.(Ed.) 481
  An Advance in Efficiency and Fraternity (Ed.) 612
  Medicine in the Time of Louis XIV of France ....(Ed.) 706
  The School of Salernum ....(Rev.) 724
  The Medical Dept. of the U. S. Army During the Period of the Revolution .....(Rev.) 727
  The Story of the American Red Cross in Italy ....(Rev.) 728
Colby, Elbridge, Capt. Infantry, O. R. C., U. S. A. Teaching—In the Army and Out *701
Colie, Edward M., Jr., Lieut. Col., M. R. C., U. S. A. Remarks Upon Paediatric Conditions in France, With Report of a Complicated Case *418
Commissioned Service in the Navy as a Vocation for the Medical Man ....(Ed.) 348
Connor, C. H., Lieut. Col., M. C., U. S. A. The American Red Cross Assistance to the United States Medical Department in the United States *232, *407
Convalescent Serum in Influenza, Early Use of. Maj. F. D. Francis, Maj. M. W. Hall and Capt. A. R. Gaines, M. C., U. S. A. ..*177
Council of National Defense, Committee on Medicine. Col. Franklin Martin, M. C., U. S. A. *549
Cowdry, E. V., M. D. The Renaissance of Medicine in China *653
Cox, Wesley C., Capt. M. C., U. S. A. Elementary Chemical and Bacteriological Aspects of the True Reaction of Culture Media *621
Craig, Col. Charles F., M. C., U. S. A.
  The Amebae Living in Man ....(Rev.) 125
  The Treatment of Syphilis ....(Rev.) 126
  Pathogenic Microörganisms ....(Rev.) 127
  Diagnostic Methods Chemical, Bacteriological and Microscopical .. . ..(Rev.) 721
  Syphilis; Diagnosis and Treatment.(Rev.) 721
  The Link Between the Practitioner and the Laboratory ..... .(Rev.) 722
  The Pathology of Influenza ..(Rev.) 723
  Practical Vaccine Treatment. ..(Rev.) 727
Culler, Robert M., Col., M. C., U. S. A. Training Down *149

Culture Media, Elementary Chemical and Bacteriological Aspects of the True Reaction of. Capt. Wesley C. Cox, A. B., M. D. and Maj. Cyrus B. Wood, B. S., M. D., M. C., U. S. A..................*621

D

Defect from Removal of Epithelioma Near Inner Canthus, Plastic Repair of (C. & C.) 715
Defective Mental and Nervous States to Military Efficiency, The Relation of. Capt. Frank Garm Norbury, M. R. C., U. S. A.................................. *20
Delousing the American Army in France. Col. H. L. Gilchrist, M. C., U. S. A.......*129
Dermatitis Exfoliativa...........(C. & C.) 616
Dermatitis Exfoliativa Following Salvarsan Administration, Four Cases of. Lieut. Jules Magnette, M. C., U. S. N..........*342
Dermatology, Text-Book on.........(Rev.) 127
Diagnostic Methods, Chemical, Bacteriological and Microscopical..........(Rev.) 721
Dibble, John, Maj., M. C., U. S. A. Operation of the Medical Division of the Air Service Since the Signing of the Armistice. *67
Disabled Service Men, Rehabilitation and Employment of...............(C. & C.) 718
Diseases of the Nervous System......(Rev.) 258
Diverticultitis, Report of a Case of Acute. Maj. Dunlap P. Penhallow, M. C., U. S. A. *610
Doane, Philip Schuyler, Lieut. Col., M. C., U. S. A. Report of the Department of Health and Sanitation of the United States Shipping Board for the Period November 16, 1917 to November 15, 1918..........*389
Duckwall, Bertram F., Maj., M. C., U. S. A. The Protective Value of Pneumococcus Vaccine Against Respiratory Disease.....*593
Duncan, Louis C., Lieut. Col. M. C., U. S. A., Medical History of General Scott's Campaign to the City of Mexico in 1847. *436, *596
  The Making of the Medical and Surgical History of the War of the Rebellion....*695
Dunham, George C., Maj., M. C , U. S. A. The Microbiology and Microanalysis of Foods.........................(Rev.) 128
Duodenal and Intestinal Feeding and Therapy Transduodenal Lavage, and Proctoclysis and the Administration of Sterile Solutions, An Apparatus For. 1st Lieut. J. Buckstein, M. C., U. S. A.(I. & A.) 118

E

Echinococcus Cyst, A Case of Multiple. Maj. Harold W. Jones, M. C., F. A. C. S..*219
Efficiency and Fraternity, An Advance in (Ed.) 612
Encephalitis Lethargica, Ocular Symptoms of. Maj. Edmund B. Spaeth, M. C., F. A. C. S.............................*230
Esmarch Bandage, The History of the (C. & C.) 717
Exostosis of Long Bones, Single. Lieut. Philip J. Reel, M. C., U. S. N. R. F. and Lieut. Carl C. Hugger, M. C., U. S. N. R. F.....................................*338
Experiences of a Naval Medical Officer. Lieut. Lincoln Humphreys, M. C., U. S. N. *524

F

Farenholt, A., Capt., M. C., U. S. N. Standardization of Material..................*303
Fauntleroy, A. M., Capt. M. C., U. S. N. Physiotherapy at the U. S. Naval Hospital New York, N. Y......................*261
Fenton, Ralph A., A. M., M. D. Spectacles for Soldiers—A Comparison of the American and German System of Supply...... *14
Foot Abnormalities and their Management in the Light of Army Experience. Maj. Tom S. Mebane, M. C., U. S. A.............*428
Foreign Body in the Lung, A Case of. Lieut. Worthington Seaton Russell, M. C., U. S. N. R. F.........................*308
Fractures, Recent Considerations in the Management of. Maj. C. Howard Moore and Maj. Alan de F. Smith, M. C., U. S A.*666
Fractures, Including a study of one hundred and eighteen cases treated by bone graft, Observations on Compound. Lieut. Col. L. J. Owen, M. C, U. S.A............... *40
Francis, F. D., Maj., M. C., U. S. A. Early Use of Convalescent Serum in Influenza..*177
Fricks, L. D., Surgeon, U. S. P. H. S. Emergency Measures and Foresight in Malaria Control...............................*224
Friedberg, Dr. Stanton A...........(Obit.) 114
Fulton, F., Lieut., M. C., U. S. N. Subsistence of Patients at Naval Hospitals and the Commissary Officers' Function.......*318

G

Gaines, A. R., Capt., M. C., U. S. A. Early Use of Convalescent Serum in Influenza .*177
Garrison, Feilding H., Lieut. Col., M. C., U. S. A. The Castle-Mitchell Roster of Medical Cadets in the United States Army (1861–1865)..........................*513
Gerstley, Jesse R., M. D. Measles and Measles-Pneumonia...................*214
Gilchrist, H. L., Col., M. C., U. S. A. Delousing the American Army in France....*129
Goldberger, Joseph, Surgeon, U. S. P. H. S. Some Commonly Misapprehended Points in the Diagnosis of Pellagra............. *94
Goldthwaite, R. H., Maj., M. C., U. S. A. Plastic Repair of Defect from Removal of Epithelioma Near Inner Canthus (C. & C.) 715
Gorgas, William Crawford, Major. General, U. S. Army....................(Obit.) 252
Gwin, Howell B., Capt., M. C., U. S. A. Advantages of Benzoate of Mercury in the Syphilitic Problem.....................*580

H

Hall, Theodore, Capt., S. C., U. S. A. Notes on Venereal Disease in the Army Based on the Study of 10,000 Cases..............*569
Hall, M. W., Maj., M. C., U. S. A. Early Use of Convalescent Serum in Influenza..*177
Hanson, Adolph M., Lieut., M. C., U. S. A. A Report of Nerve Injuries Cared For at Evacuation Hospital No. 8, A. E. F......*662
Health News...................(C. & C.) 255
Herms, William B. Malaria Drainage Operations at the Port of Embarkation, Newport News, Va....................... *81
History of the War of the Rebellion, The Making of the Medical and Surgical. Lieut. Col. Louis C. Duncan, M. C., U. S. A..................................*695
History of the Medical Activities of the Officers of the Provost Marshal General Under the Selective Service Act. Col. F. R. Keefer, M. C., U. S. A............*475
Hospitals and a Prospectus of the Future, The Year's Work in Military. Maj. Floyd Kramer, M. C., U. S. A................*681
Hugger, Carl C., Lieut., M. C., U. S. N. R. F. Single Exostosis of Long Bones..........*338
Human Infection Carriers...........(Rev.) 123
Humphreys, Lincoln, Lieut., M. C., U. S. N. Experiences of a Naval Medical Officer...*524

I

Influenza, The Pathology of.........(Rev.) 723
Influenza in a Regiment, The Recurrence of. Capt. Samuel Bradbury, M. C., U. S. A..*471

Injuries, Some Observations on our War Experience with Face and Jaw. Vilray Papin Blair, A. M., M. D., F. A. C. S. . . . *379
Interallied Surgical Conference, The. (Ed.) 481
International Congress of Military Medicine and Pharmacy, The. . . . . (C. & C.) 719
Ireland, M. W., Surgeon General U. S. Army, General William Crawford Gorgas. (Obit.) 252

J

Jones, Harold W., Maj., M. C., F. A. C. S. A Case of Multiple Echinococcus Cyst. . . *219
Jordan, Lewis G., Lieut., M. C., U. S. N. Report of a Mastoid Series. *310

K

Kearny, Richard A., M. D. The Nose, Paranasal Sinuses Nasolacrimal Passageways and Olfactory Organ in Man (Rev.) 258
Keefer, F. R., Col., M. C., U. S. A. History of the Medical Activities of the Officers of the Provost Marshal General under the Selective Service Act. *475
Kramer, Floyd, Maj., M. C., U. S. A. The Year's Work in Military Hospitals and a Prospectus of the Future. *681
Kremers, E. D., Maj. M. C., U. S. A. Some of the Newer Work on Nephritis. *48

L

Lessons of the War Which May be Applicable to Civil Practice. John Smyth, M. D., F. A. C. S. *100
Lest We Forget. . . . . (Ed.) 247
Livesay, H. R., 1st Lieut., M. C., U. S. A. Review of the Bacteriology and Pathology of twenty-nine Cases of Pneumonia Coming to Autopsy in a Military Hospital (C. & C.) 713
Lowndes, C. H. T., Capt., M. C., U. S. N. Physiotherapy at the U. S. Naval Hospital, New York, N. Y. *261

M

Magnette, Jules, Lieut., M. C., U. S. N. Four Cases of Dermatitis Exfoliativa Following Salvarsan Administration *342
Malaria Control, Emergency Measures and Foresight in. Surgeon L. D. Fricks, U. S. P. H. S. *224
Malaria Drainage Operations at the Port of Embarkation, Newport News, Va. Wm. B. Herms. *81
Manual, a Diabetic. . . . . (Rev.) 488
Manual of Psychiatry . . . . (Rev.) 124
Martin, Franklin, Col., M. C., U. S. A. Council of National Defense, Committee on Medicine. *549
Mastoid Series, Report of a. Lieut. Lewis G. Jordan, M. C., U. S. N. *310
Material, Standardization of. Capt. A. Farenholt, M. C., U. S. Navy. *303
McCullough, F. E., Capt., M. C., U. S. N. Physiotherapy at the U. S. Naval Hospital, New York, N. Y. *261
McGuire, Frank W., M. D. The Frank W. McGuire Rib Spreader . . . . (I. & A.) 720
Measles and Measles-Pneumonia. Jesse R. Gerstley, M. D. *214
Mebane, Tom S., Major, M. C., U. S. A. Foot Abnormalities and Their Management in the Light of Army Experience . . . *428
Medical Cadets in the United States Army (1861–1865), The Castle-Mitchell Roster of. Lieut. Col. Fielding H. Garrison, M. C., U. S. A. *513
Medical Department of the United States Army During the Period of the Revolution, The. . . . . (Rev.) 727
Medical History of General Scott's Campaign to the City of Mexico in 1847. Lieut. Col. Louis C. Duncan, M. C., U. S. A. *436, *596
Medical History of the War. . . . . (Ed.) 112
Medical War Manual No. 8. . . . . (Rev.) 724
Medicine in the Time of Louis XIV of France. . . . . (Ed.) 706
Metcalfe, R. F., Col., M. C., U. S. A. History of the Activities of the Attending Surgeon's Office. *532
Microbiology and Microanalysis of Foods, The. . . . . (Rev.) 128
Military Medicine at the Imperial War Museum . . . . (C. &C.) 256
Moore, C. Howard, Maj., M. C., U. S. A. Recent Considerations in the Management of Fractures. *666
Morale in Naval Hospitals. Lieut. Comdr Joel T. Boone, M. C., U. S. N. *268
Morris, S. J., Lieut. Col., M. C., U. S. A. History of the Overseas Division, Surgeon General's Office, During the War Period. *180
Munson, Francis M., Lieut., M. C., U. S. N., (Ret.)
  Human Infection Carriers. . . . . (Rev.) 123
  The Principles of Anatomy. . . . . (Rev.) 488
  A Diabetic Manual. . . . . (Rev.) 488
  The Duodenal Tube and Its Possibilities. (Rev.) 488
  A General Introduction to Psychoanalysis. (Rev.) 488
  Public Health and Insurance. . . . . . (Rev.) 489
  Regional Anesthesia. . . . . (Rev.) 489
  Symptoms in the Diagnosis of Disease (Rev.) 489

N

Neal, C. Aleshire, Lieut. Col., M. C., U. S. A. Dermatitis Exfoliativa. . . . . (C. & C.) 616
Nephritis, Some of the Newer Work on. Maj. E. D. Kremers, M. C., U. S. A. *48
Nerve Injuries Cared for at Evacuation Hospital No. 8, A. E. F. Lieut. Adolph M. Hanson, M. C., U. S. A. *662
Neurologic Service in Naval Hospitals. Lieut. Comdr. R. Sheehan, M. C., U. S. N. . *295
Nichols, Henry J., Maj., M. C., U. S. A. Directions for making triple typhoid vaccine, with introduction *359
Norbury, Frank Garm. Capt., M. R. C., U. S. A. The Relation of Defective Mental and Nervous States to Military Efficiency. *20
Nose, Paranasal Sinuses, Nasolacrimal Passageways, and Olfactory Organ in Man, The. . . . . (Rev.) 258

O

Obituary. 260, 619
Oertel, T. E., Maj., M. C., U. S. A. The Catarrhal and Suppurative Diseases of the Accessory Sinuses of the Nose. . . . . (Rev.) 357
  Medical War Manual No. 8 . . . . (Rev.) 724
Overseas Division, Surgeon General's Office, During the War Period, History of. Lieut. Col. S. J. Morris, M. C., U. S. A. . . . *180
Owen, L. J., Lieut. Col., M. C., U. S. A. Observations on Compound Fractures, Including a study of one hundred and eighteen cases treated by Bone Graft. *40

P

Paediatric Conditions in France, with Report of a Complicated Case, Remarks Upon. Lieut. Col. Edward M. Colie, Jr., M. R. C., U. S. A. *418
Pathogenic Microörganisms. . . . . (Rev.) 127
Pathology of War Gas Poisoning. . . . . (Rev.) 259
Peace, The Maintenance of. . . . . (Rev.) 617
Pellagra, Some Commonly Misapprehended Points in the Diagnosis of. Surgeon Joseph Goldberger, U. S. P. H. S. *94

Penhallow, Dunlap P., Maj., M. C., U. S. A. Report of a Case of Acute Diverticulitis. . *610
Phillips, Hiram A., Maj., M. C., U. S. A. Resection of the Elbow Joint. *473
Physiotherapy at the U. S. Naval Hospital, New York, N. Y. Capt. C. H. T. Lowndes, M. C., U. S. N., Capt. F. E. McCullough, M. C., U. S. N.; Capt. A. M. Fauntleroy, M. C., U. S. N.; and Comdr. Wm. Seaman Bainbridge, M. C., U. S. N. R. F. *261
Physiotherapy, Records of the Department of. *266
Pleadwell, F. L., Capt., M. C., U. S. N. Types of Motor Ambulances Observed Abroad. *331
Polish Relief Expedition, American (C. & C.) 718
Polish Relief Expedition, Memorandum from the American. . . . . (C. & C.) 185
Practitioner and the Laboratory, The Link Between the. . . . . (Rev.) 722
Practical Dietetics with Reference to Diet in Health and Disease. . . . . (Rev.) 724
Public Health and Insurance. . . . . (Rev.) 489
Psychiatry in the Army, The Future of. Col. Thomas W. Salmon, M. R. C., U. S. A. *200
Psychoanalysis, A General Introduction to (Rev.) 488

R

Reconstruction and the Measures of Coöperation practiced by the Medical Department of the Army and Federal Board for Vocational Education, Modern Military Medical and Surgical. Col. Frank Billings, M. R. C., U. S. A. *1
Reel, Philip J., Lieut., M. C., U. S. N. R. F. Single Exostosis of Long Bones. *338
Renaissance of Medicine in China, The E. V. Cowdry, M. D. *653
Report of the Department of Health and Sanitation of the United States Shipping Board for the period November 16, 1917 to November 15, 1918. Lieut. Col. Philip Schuyler Doane, M. C., U. S. A. *389
Research Information Bureau, A. . (C. & C.) 717
Resection of the Elbow Joint. Maj. Hiram A. Phillips and Capt. E. M. P. Sward, M. C., U. S. A. *173
Review of the Bacteriology and Pathology of twenty-nine Cases of Pneumonia Coming to Autopsy in a Military Hospital. Maj. Wm. H. Bailey, M. C., and 1st Lieut. H. R. Livesay, M. C., U. S. A. . . . . (C. & C.) 713
Rib Spreader, The Frank W. McGuire (I. & A.) 720
Ruptured Urethra With Fractured Pelvis, Report of a Case of. Lieut. J. Richard Allison, M. C., U. S. N. *324
Russell, Frederick F., Col., M. C., U. S. A. Directions for making triple typhoid vaccine, with introduction. *359
Russell, Worthington Seaton, Lieut., M. C., U. S. N. R. F. A Case of Foreign Body in the Lung. *308

S

Salmon, Thomas W., Col., M. R. C., U. S. A. The Future of Psychiatry in the Army. . . *200
School of Salernum, The. . . . . (Rev.) 724
Shaffer, Carl W., Maj., M. C., U. S. A. The Problem of Administering Venereal Prophylaxis in Cities Adjacent to Army Camps. *574
Sheehan, R., Lieut. Comdr., M. C., U. S. N.
  Neurologic Service in Naval Hospitals. . . *295
  Diseases of the Nervous System. . . . (Rev.) 258
Smith, Alan de F., Maj., M. C., U. S. A. Recent Considerations in the Management of Fractures. *666
Smyth, John, M. D., F. A. C. S. Lessons of the War Which May be Applicable to Civil Practice. *100
Spaeth, Edmund B., Maj., M. C., F. A. C. S. Ocular Symptoms of Encephalitis Lethargica. *230
Spectacles for Soldiers—A Comparison of the American and German System of Supply. Ralph A. Fenton, A. B., M. D. . . *14
Stark, A. N., Col., M. C., U. S. A. Medical Activities of the American Expeditionary Forces in the Zone of the Armies. *154
Stephenson, C. S., Lieut. Comdr., M. C., U. S. N. Yaws; With Report of a Case Which Developed in a Temperate Climate. *344
Sternberg, George Miller. . . . . (Rev.) 617
Stimmel, Clarence O., Capt., M. A. C., U. S. A. Directions for making triple typhoid vaccine with introduction. *359
Subsistence of Patients at Naval Hospitals and the Commissary Officers' Function. Lieut. F. Fulton, M. C., U. S. N. *318
Surgical Clinics of Chicago, The. . . . . (Rev.) 725
Surgical Shock and the Shockless Operation through Anoci-Association. . . . . (Rev.) 124
Sward, E. M. P., Capt., M. C., U. S. A. Resection of the Elbow Joint. *173
Symptoms in the Diagnosis of Disease (Rev.) 189
Syphilis; Diagnosis and Treatment. . . (Rev.) 721
Syphilis, The Treatment of. . . . . (Rev.) 126
Syphilitic Problem, Advantages of Benzoate of Mercury in the. Capt. Howell B. Gwin, M. C., U. S. A. *580
Summers, John E., M. D.
  Surgical Shock and the Shockless Operation through Anoci-Association . . . (Rev.) 124
  1918 Collected Papers of the Mayo Clinic (Rev.) 125
  The Surgical Clinics of Chicago. . . . (Rev.) 725
  Chirurgie Reparatrice et Orthopedique (Rev.) 725

T

Teaching—In the Army and Out. Capt. Elbridge Colby, Infantry, O. R. C. *701
Tempora Mutantur et Nos Mutamur in Illis (Ed.) 479
Tinker, Martin B., Lieut. Col., M. R. C., U. S. A. The Results of Wound Excision with Suggestions as to Improvements and Alternative Methods. *674
Training Down. Col. Robert M. Culler, M. C., U. S. A. *149
Truby, Albert E., Col., M. C., U. S. A. Operation of the Medical Division of the Air Service Since the Signing of the Armistice. *67

U

Urethral Sound, A Modification of the (C. & C.) 716
Urethritis and Prostatitis, Dependent Upon Colon Bacillus Infection, Chronic. Capt. Charles E. Verdier, M. R. C., U. S. A. . . . *109

V

Vaccination Against Pneumonia, Note on the Value of Prophylactic. P. A. Surg. L. A. Burnside, U. S. P. H. S. *589
Vaccine, Directions for Making Triple Typhoid, with Introduction. Col. Frederick F. Russell, M. C., U. S. A., Maj. Henry J. Nichols, M. C., U. S. A. and Capt. Clarence O. Stimmel, M. A. C., U. S. A. . *359
Vaccine Treatment, Practical. . . . . (Rev.) 727
Value of Pneumococcus Vaccine Against Respiratory Disease, The Protective. Maj. Bertram F. Duckwall, M. C., U. S. A. *593
Venereal Disease in the Army Based on a Study of 10,000 Cases, Notes on. Capt. Theo. Hall, S. C., U. S. A. *569

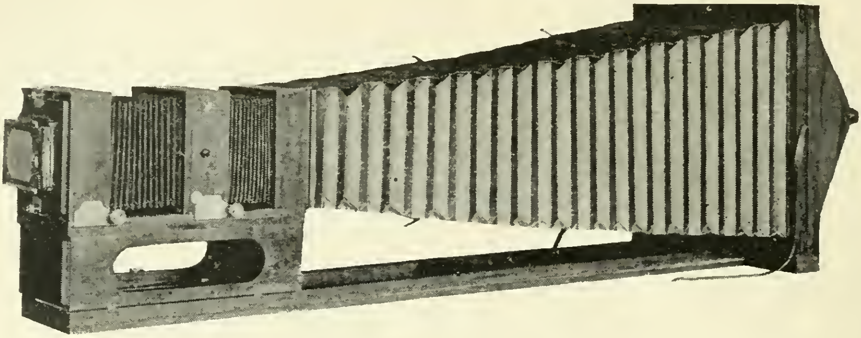
Venereal Prophylaxis in Cities Adjacent to Army Camps, The Problem of Administering. Maj. Carl W. Shaffer, M. C., U. S. A.*574
Venereal Record in the Army of the United States, Factors Making for a Low. Col. P. M. Ashburn, M. C., U. S. A. *208
Verdier, Charles E., Capt., M. R. C., U. S. A. Chronic Urethritis and Prostatitis, Dependent Upon Colon Bacillus Infection. . .*109

W

Wallace, James F., Capt., M. C., U. S. A. Text-book on Dermatology. . . . .(Rev.) 127
War Work of the Rockefeller Institute for Medical Research, N. Y. *491
War Service, The American Medical Association's. *557
Webb, Walter D., Maj., U. S. A., (Ret.) Wounds of the Lung and Pleura. . . . (Rev.) 726
Wellcome Prize Essay. *20
Wood, Cyrus B., Major, M. C., U. S. A. Elementary Chemical and Bacteriological Aspects of the True Reaction of Culture Media. *621
Wound Excision with Suggestions as to Improvements and alternative methods. The Results of. Lieut. Col. Martin B. Tinker, M. R. C., U. S. A. *674
Wounds of the Lung and Pleura. . . . . (Rev.) 726

Y

Yaws; With Report of a Case Which Developed in a Temperate Climate. Lieut. Comdr. C. S. Stephenson, M. C., U. S. N.*344



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